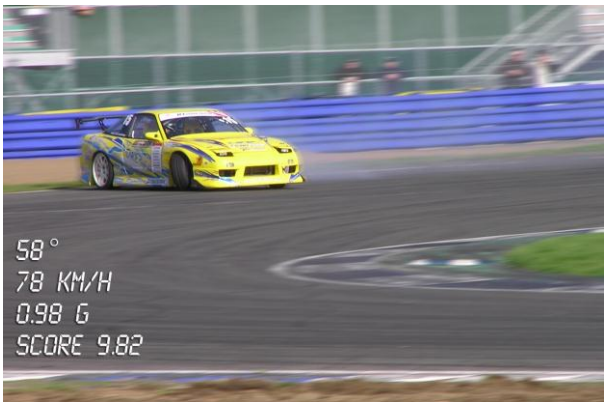
Congratulations on your purchase and welcome to the worldwide DriftBox community.

Drifting

With your DriftBox you will be able to display and log your drifting performance. DriftBox also generates a performance related Drifting Score, which you can submit to the DriftBox website for inclusion in the worldwide DriftBox drifting league tables. See how your skills compare to other DriftBox users from around the world at **www.driftbox.com**



Band km/h	Username	Score	Angle	@Speed	Car	Date
160+	Satoshi-san	8.62	48	166 kmh	Skyline GTR	15/12/2005
125 - 159	Castle68	8.99	56	133 kmh	RX7	8/11/2005
100 -124	JSmith77	9.55	64	122 kmh	M3	24/08/2005
75 - 99	MickyBb	8.22	42	88 kmh	200sx	18/11/2005
50 - 74	BillyBurs69	9.12	51	66 kmh	350z	7/10/2005

Performance

With DriftBox it is very easy to measure acceleration times, braking distances, quarter mile times and many more. There are a number of configurable screens that show specific test results such as 0-60, 0-100, 0-100-0, ½ mile and ¼ mile etc.

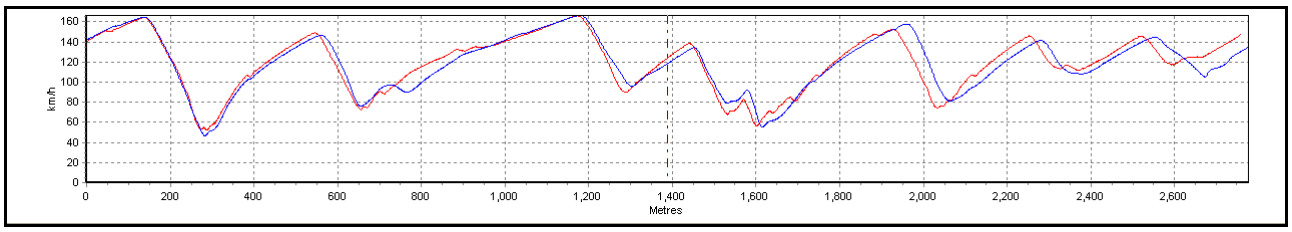
DriftBox is based on the Racelogic VBOX, which is used by the majority of Car Manufacturers, Tyre Manufacturers and car magazines around the world to assess performance.

Because it is very easy to edit the test ranges, DriftBox is a very powerful tool for use in many different kinds of vehicle testing.

Lap Timing

Displaying your Lap times as you drive around a circuit is simple with DriftBox. You can display your last and best Lap times and Lap count, and also display split times for up to six specified split points around the lap.

Through the DriftBox website and forum you are able to download circuit overlays from around the world, compare lap times, and share lap overlay data with other users.



Speed Display

DriftBox has a display screen mode that shows a large digital speed value and compass. In open conditions, DriftBox has a velocity accuracy of 0.1km/h, which is useful for checking the accuracy of your vehicle's speedometer. In this mode there are also Odometer and Height display screens.

This display has a 'Point of Interest' facility, which alerts you as you approach the position of a point of interest such as a safety camera or service station. POI files can be created and edited for custom use.

Power Calculations

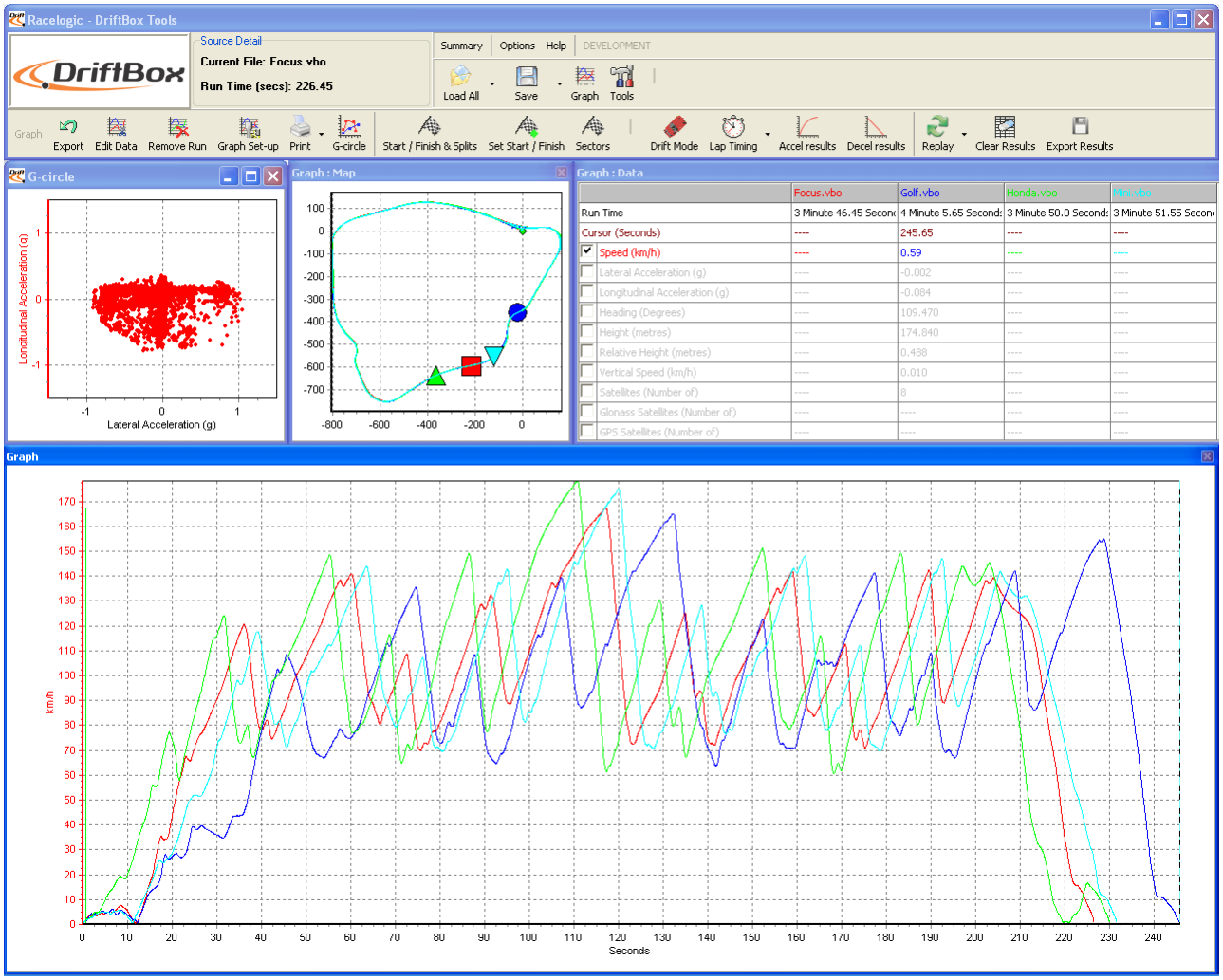
DriftBox can help you to measure the power developed by your car's engine, either at the wheels or flywheel. Having set the vehicle weight, results are calculated from the measurements taken by the fast GPS engine to give you useful guidelines to the car's brake horsepower or kilowatt output. Because these calculations are made from the GPS data rather than accelerometers, your results are likely to be more consistent and accurate.

Data Logger

For drivers keen to improve their lap times and get valuable feedback on technique, DriftBox includes a sophisticated, fully functioning data logging package. If used with a 64mb SD card, DriftBox can log up to 50 hours of continuous data, which can be analysed in great detail in the available software.

This software allows graphical analysis of acceleration, braking, cornering and lap times, and if the DriftBox is used in conjunction with a Micro Input Module, data from the vehicle itself (such as RPM and throttle angle) is recorded alongside the GPS parameters.

You can overlay up to four files, and you get an accurate track map to compare your driving line between different laps. The software also features a graph measure tool, allowing for precise analysis of performance figures. Data-logging capabilities are further enhanced by automatically generated text data on the SD card.



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Drifting

DriftBox is the first performance meter to measure Drift Angle. A car is said to be drifting when the rear wheels have a lateral (sideways) motion in relation to the road as well as a longitudinal (fore-aft) motion. In fact, the moment a car starts to turn a corner, the rear wheels need a certain amount of side-slip to go around the corner, even if you are going very slowly.

DriftBox will measure the angle between the direction the car is pointing, and the direction the car is going.

Because the rear wheels need to slide a small amount to turn a corner, DriftBox will show a small angle (usually <5 degrees) when cornering normally, but round very tight bends this can sometimes be up to 10 degrees.

When using DriftBox, a drift is defined as anything over 5 degrees and 25kmh, but in most cases you are not really drifting unless you are showing 10 degrees or more. The very top drifters have recorded angles (using DriftBox of course!) of 65 degrees, at over 100km/h, but this requires a lot of power, sticky tyres, a modified steering rack and a large amount of skill.

NOTE: Drifting should only be carried out in a controlled environment, and under no circumstances on the public highway. Please make sure you are in a large open area, and you are wearing a suitable helmet. Drifting can be immensely rewarding when you have mastered the technique, but you run a high risk of spinning out of control every time you lose traction of the rear wheels.

Drifting techniques

There are many ways of making a car drift, here is a brief explanation of some of the more popular methods. Techniques vary depending on whether your car is Front engined Rear wheel drive (FR) or Front engined Front wheel drive (FF).

Hand Brake (FR & FF)

This is the simplest way of breaking traction on the rear wheels. Pulling on the handbrake will lock up the rear wheels, and this will cause the amount of grip at the rear end to drop very suddenly and the car will slide from the rear. The downside is the car will slow down during application of the handbrake. This technique is normally used to initiate the drift, but you cannot use this for sustained drifting.

Power Oversteer (FR)
In a powerful car, flooring the throttle whilst turning the steering will cause the rear wheels to start spinning, which will reduce the amount of grip at the rear end, causing the tail to try and overtake the front of the car. Applying opposite lock on the steering, and then modulating the throttle to keep the rear wheels spinning is the method of controlling this situation. However, the more the wheels spin, the less grip they give, so if you apply too much throttle, the car will spin out, and if you use too little, the car will stop sliding. Get the balance right, and you've cracked it!

Feint or Scandinavian Flick (FR & FF)
In a high speed corner, you can usually make the rear end start to slide by turning one way under power, lifting off, and then quickly turn the other way, so you are making a 'feint' the opposite way before you go round the corner. There is a weight transfer to the front of the car making it grip, whilst the rear becomes unloaded and should start to slide.

Clutch kick or Diff-lock (FR)
To perform a clutch kick, the throttle is applied fully and then the clutch is very briefly disengaged (the 'kick'). This causes the engine revs to rise suddenly and then immediately transfer the extra momentum of the engine/flywheel to the rear wheels, thereby promoting wheel spin. If you are going round a bend when you use this technique, the car should start to slide immediately.

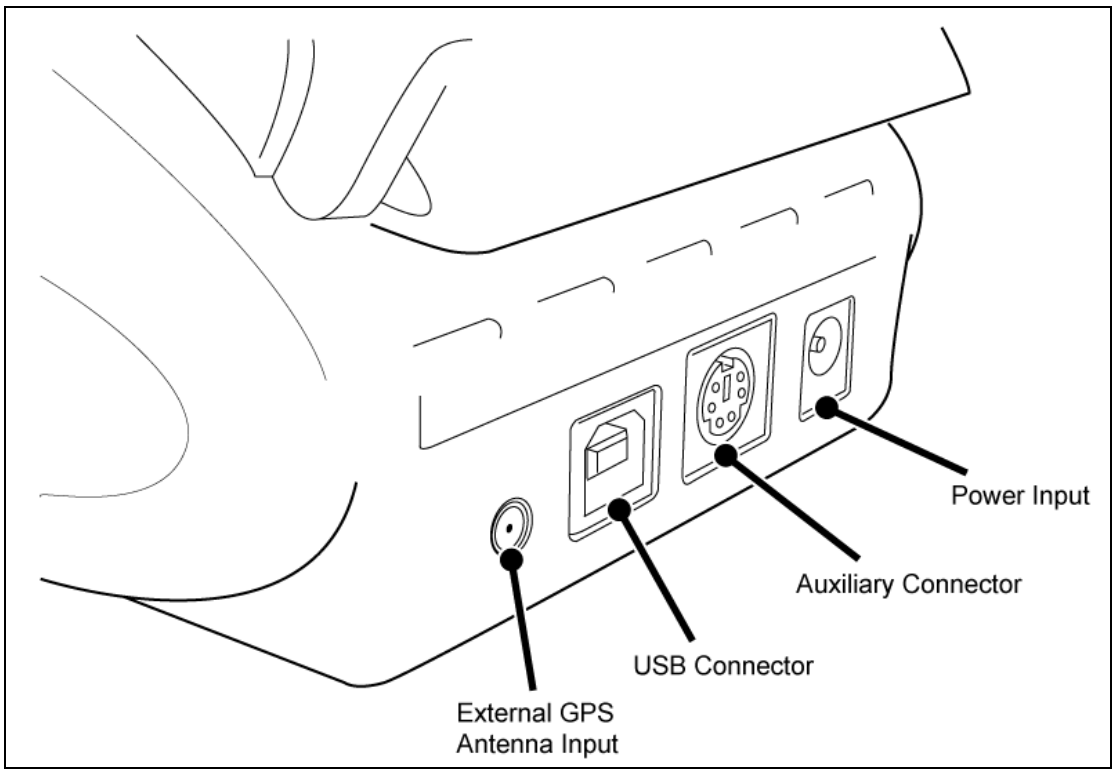
Be prepared to wind on opposite lock very quickly, and come off the throttle because there is a very quick transition from gripping to sliding using this method. Ideally the throttle should then be re-applied to keep the car sliding.

Trail Braking
This involves keeping the brakes on as you turn into a fast corner, this works best on a downhill corner as less speed is lost.

There are many ways to drift a car, and we have only covered the basics. For more detailed information please use resources such as www.drifting.com, www.dailydrifter.com, www.driftworks.co.uk and www.driftbox.com.

Quick Start Guide

Connections

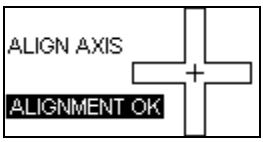


Mounting DriftBox in your car

1. Connect the cigar lighter adaptor power cable to the power socket on the back of your DriftBox.
2. Slide DriftBox into the windscreen mounting bracket.
3. Using the suction cups of the windscreen mounting bracket, fix the DriftBox assembly to a suitable place low down in the centre of your windscreen.
4. DriftBox has an internal GPS antenna, so try to mount DriftBox where it will have the largest possible view of the sky.
5. Park your vehicle outside in an open area away from obstacles such as tall buildings and trees.
6. Insert the DriftBox power cable into the vehicle cigar lighter socket. If power is not permanently available at this socket, turn on the ignition to ensure power at the socket.
7. The first time DriftBox is used it will need to be left for 10-15minutes to acquire fully the latest satellite constellation information.
8. After this initial period, DriftBox will then only take 1-2 minutes to lock onto satellites when you use it next time.
9. Wait for the satellite image to disappear which means lock has been obtained.
10. Before using DriftBox for measuring Drift performance you will need to align the internal motion sensors.

Aligning Your DriftBox

1. Park your vehicle on flat ground and turn the engine off.
2. Press the **MENU** button, then highlight 'Setup' and press the **OK** button.
3. Highlight the 'ALIGNMENT' option and press **OK**
4. The following alignment screen appears :



5. The screen shows two small lines, a horizontal line and a vertical line within a large cross.
6. Loosen the mounting screws if required and move the suction mount position so that the two small lines align in the centre of the screen and make the shape of a cross.
7. When the alignment is correct the screen will say 'Alignment OK', then tighten up the mounting screws. If the unit needs aligning left to right, release the suction cups and rotate the DriftBox.
8. Confirm the screen still says 'Alignment OK' then press **OK**. For a more detailed instruction regarding the alignment procedure see the 'Setup Menu' section of this manual.
9. Now press the **MENU** button to exit the menus screen and return to the Drift Mode screen.

Your DriftBox is now ready to show your Drift Angle. Note that this alignment is only needed when using the Drift Mode.

Registering your DriftBox and activating all available functions.

To get full DriftBox functionality including data logging, lap timing and performance mode, you need to register your DriftBox at the DriftBox website.

Registering Your DriftBox

Log onto the DriftBox website www.driftbox.com then go into Product Registration where you will be asked to input information including the serial number of the unit. The serial number is displayed when you first switch on, or alternatively you can note it from the underside of the DriftBox hardware itself (the serial number will begin with 301.) Once you have entered your details you will be emailed an activation code. In the case of web-based email accounts, such as Hotmail, it may be necessary to check the junk email folders. If the activation code email does not arrive in a timely manner please alert our support team by emailing sales@driftbox.com with your serial number.

Activating Your DriftBox additional functions

1. Switch on DriftBox
2. Press **MENU** and select 'SETUP'
3. Select 'UPGRADE'

4. Use ▼▲ to move the alphanumerical list across the screen and then press **OK** to enter each character of your activation code. The centre character on the screen becomes larger and surrounded by a box to indicate that it is ready for selection.
5. Highlight and click on the symbol ← if you need to delete a character.

6. Then when you have entered all the characters of the activation code highlight the symbol ↵ and press **OK** to enter the activation code**.**
7. A confirmation screen will display 'Code OK' and then the screen will go back to SETUP MENU.
8. Now disconnect and then reconnect the power to DriftBox.

The full functionality of your DriftBox will now be available.

Optional Accessories / Replacement Parts

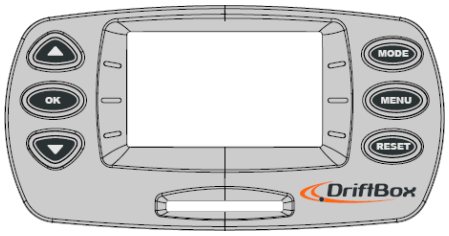
Description:	Racelogic Part Number:
SD Card (2GB)	RLACS083
External GPS Antenna	RLACS070
Mains Power Supply (UK / EU / US / JP / AU)	RLACS074-UK / -EU /-US / -JP / -AU
Windscreen Mount	RLACS071
Windscreen Mount Suction Cup	DBSUCTIONCUP
Cigar Lighter Power Cable	RLCAB041
USB Lead	RLCAB042
2 Ahr Battery Pack with Charger	RLACS072
Serial cable - NMEA Messages	RLCAB040
Serial cable – Telemetry	RLCAB044
Radio + Cable to DriftBox	RLDBRADD
Radio + Cable to Laptop	RLDBRADL
Radio Kit (two DriftBox radios and one laptop radio incl. all cables and software)	RLDB3RADKIT
Micro Input Module	RLPBMICIN01

Please contact your local DriftBox distributor for pricing and availability.

Using DriftBox

Your DriftBox can be used in a variety of modes, as described in this section.

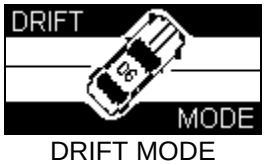
DriftBox Keypad



	Used to show next screen, or to navigate menu.		Changes Mode.
	Select the menu item that is highlighted on the screen and used to show Score Code.		Accesses the relevant menu, or will exit from current menu.
	Used to show previous screen, or to navigate menu.		Resets totals, averages and peaks if held for 1.5s. Hold for 5s for global Reset.

Changing Modes

Press the **MODE** button to swap between the 7 display modes

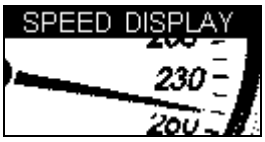


DRIFT MODE

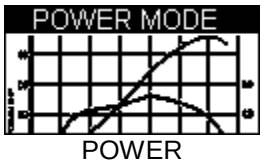
PERFORMANCE

LAPTIMING

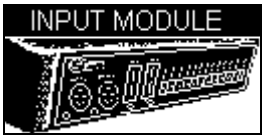
PREDICTIVE MODE



SPEED DISPLAY



POWER



INPUT MODULE

Changing the Units of Measurement

1. Press the **MENU** button from any of the Display Modes.
2. Highlight UNITS and press **OK**.
3. Highlight SPEED and press **OK**.
4. Highlight KMH or MPH and then press **OK** to tick that selection.
5. Highlight EXIT and press **OK**.

To change the Distance units from metres to feet, follow the same procedure but highlight DISTANCE and press **OK**.

Satellite Reception

DriftBox calculates all of its logged data from the information it receives from GPS satellites and relies on being able to get a good lock to produce this data. So it is imperative that DriftBox (or optional external antenna) is placed in the best possible position for a clear view of the sky.

If you are using an external antenna, ensure that it is connected **before** you power up DriftBox.

The location that you drive in can also affect data quality, if you drive in a very built up area or an area with overhanging trees then the signal quality can degrade. If the satellite reception does drop out in use, you will see either of the following symbols:

1. LOW SATS

2.

3. LOW SATS

Searching for satellites at power up

Whilst the DriftBox is acquiring satellites it will flash the image of a satellite, the location of the flashing image depends on the screen you are in.

Drift Mode

Drift Mode is used to measure your drifting ability, showing current and maximum drift angles and give a grading of your performance as a score between 0 and 10 points. Scores can be sent to the DriftBox website for publishing on the Top Scores database.
By default, Drift Mode is enabled however when Predictive mode is enabled, Drift Mode becomes disabled.

On a fully activated DriftBox an SD card can be inserted to log your scores and data from your runs that can then be downloaded and viewed on your computer and in the DriftBox Tools PC software.

The Drift Mode can be used in two different ways; Sectors and Practice. The default is Practice, but you can turn on Sectors in the Drift Menu.

Practice

Without Sectors enabled, the DriftBox measures a single run at a time, where a run is defined as anything larger than 5^{o} of drift and a speed greater than 25Km/h. The run finishes when you go below these thresholds. You can then see Peak Drift angle, speed at which that drift angle occurred, the peak Lateral G during the run and the overall Score which is based on Lateral G and Drift Angle.

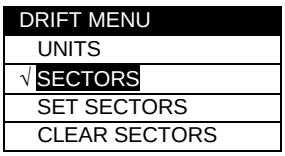
Sectors

When Sector Mode is selected, a run starts at one virtual gate and finishes at another, see the ‘Sectors’ section later on for more details.

Selecting Sector Mode

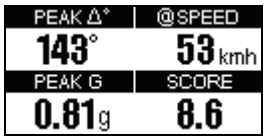
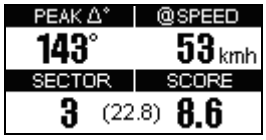
To set DriftBox to Sector mode

- In Drift Mode, press **MENU**
- Select ‘Sectors’ then press the **OK** button.



Drift Mode Display Screens

DriftBox has three different screens, available in each mode, which are selected by using the ▲▼buttons.

	This screen shows speed and drift-angle in real-time, as well as the peak drift angle achieved. Holding the reset button for 1.5s will reset the peak drift angle.
	**Practice Mode Only** This screen shows the peak drift angle, the speed at which it was achieved, the maximum lateral acceleration achieved, and the score awarded by DriftBox for the run.
	**Sectors Mode Only** Shows the peak drift angle, the speed at which it was achieved, the sector number, the score awarded by DriftBox for the run, and the cumulative score in brackets.
	SPIN! is displayed if the drift is greater than 100 degrees, or the drift is greater than 45 degrees with the speed<10 kmh.

Resetting the screens

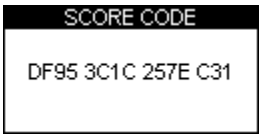
In any of the Drift mode screens, the Peak, Average, Score and Speeds can be reset by pressing the **RESET** button for 1.5 s.

Score Codes

Scores are generated by DriftBox based on the performance of a drift, you can enter the DriftBox league with your own scores, but you will need the validation code to verify your score. You can enter this validation code onto the website under My DriftBox → My high score.

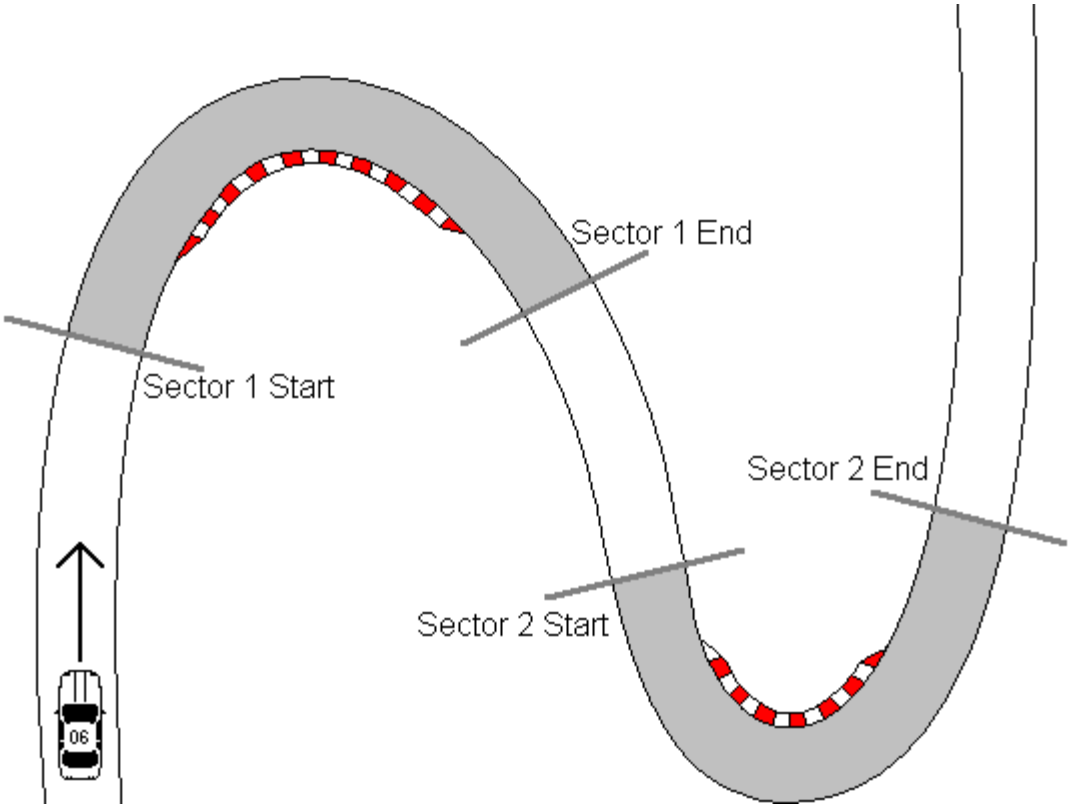
Viewing the Score Code

Validation codes are automatically saved to a file on the SD card called 'Scores'.txt', but you can also press the **OK** button to display a score code on the screen of DriftBox.



Sectors

A sector is made up of two virtual gates. If you have enabled Sectors Mode, the measurement process starts at the first gate, and ends at the second. You can have up to 6 sectors defined, and you will be awarded a score for each sector along with a cumulative score. You do not have to have all 6 sectors defined, you can use just one if required. Note that to score in a sector you have to be drifting continuously, if you straighten up at some point, your score is zeroed at that point.



Sectors are defined separately from Splits because they come in pairs.

Creating Sectors

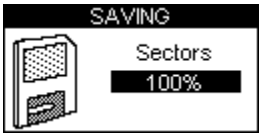
- Press the **MENU** button to enter the Drift menu.
- Make sure ‘SECTORS’ is ticked.
- Highlight the option ‘SET SECTORS’ and press **OK**.
- Drive towards the start of the first sector and press **OK**.
- Carry on driving to the end of the first sector and then press **OK**.
- The screen will now highlight ‘Start2’ and you can continue to set up to six sectors in the same manner. If you want to skip over any sectors, press **RESET**
- When you have completed the setting of your sectors press the **MENU** button to return to the Drift screen.

Loading and Saving Sectors

After creating sector information in your DriftBox you can then save this information to a sector file on the SD card. This allows the sector information to be copied onto your computer and used in the DriftBox software when you analyse your logged data. The sector file will be named DBOX.sct – this is the only file name that DriftBox will recognise as a sector file (see page 57 'Defining Drifting Sectors in DriftBox Tools' for further details.)

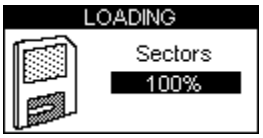
Saving a sector file

- Press the **MENU** button to enter the Drift Menu
- Highlight the 'Save Sectors' option and press **OK**



Loading a sector file

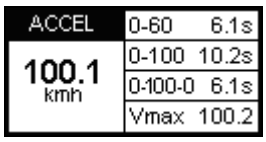
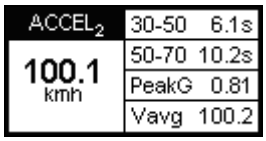
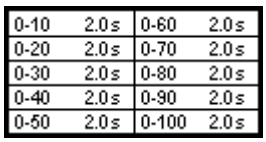
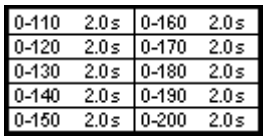
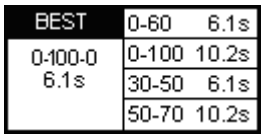
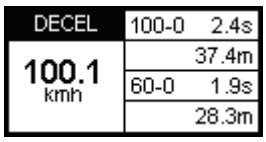
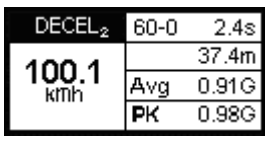
- Press the **MENU** button to enter the Drift menu
- Highlight the 'Load Sectors' option and press **OK**

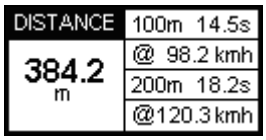
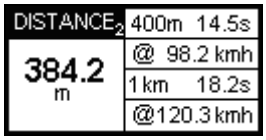


Performance Mode

The Performance mode is used to measure the acceleration and braking performance of your vehicle. Press the **MODE** button to scroll to the Performance Mode screen. This mode is divided into six screens, each of which displays different performance data. Navigate between these screens by using the ▲ ▼ buttons. Each screen will automatically display the results as they happen, e.g. if you drive from 0 Mph to 60 Mph then the 0-60 section will show the time taken.

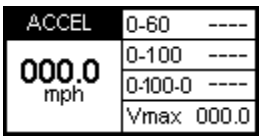
Below is a list of the available Performance Mode display screens.

	This Acceleration Screen displays a live velocity in the left half and in the right it shows the times of the following pre-set test ranges. 0 to 60, 0-100 and 0-100-0. It also shows the maximum speed.
	Acceleration 2 screen shows the 30-50 and 50-70 times. However these two test ranges are user adjustable through the setup menu. Peak lateral g (cornering force) is also shown along with an average velocity value.
	The next screen shows the times required to reach various speeds from rest. The target speeds are every 10 km/h or mph (depending on the units selected), up to a speed of 100 km/h / mph.
	This screen continues the readings of the previous screen, listing the speeds from 110 to 200 km/h / mph.
	This screen shows the best results of the two test ranges from each of the acceleration screens.
	This screen shows the time and distance of two user adjustable deceleration ranges. These test ranges can be configured in the setup menu.
	This screen shows the same information as the previous Deceleration screen, but for a different user-defined speed range.

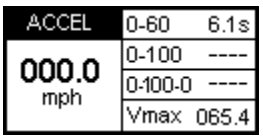
	This screen shows the time and end velocity of two user-configurable distances, i.e. 0-100m. If the units are changed to feet then the two test ranges default to 60' and 330', but can be changed to the desired distance.
	This screen shows the time and end velocity of two user-configurable distances, i.e. 0-400m. If the units are changed to feet then the two test ranges default to 660' and 1320', but can be changed to the desired distance
	This screen shows the current acceleration and peak acceleration achieved by DriftBox. A level bar at the bottom of the screen also shows this information in graphical form. The MAX value is cleared by pressing the **RESET** button.
	This screen shows the current deceleration and peak deceleration achieved by DriftBox. A level bar at the bottom of the screen also shows this information in graphical form. The MAX value is cleared by pressing the **RESET** button.
	This screen shows the current lateral acceleration and peak lateral acceleration achieved by the DriftBox. A level bar at the bottom of the screen also shows this information in graphical form. The MAX value is cleared by pressing the **RESET** button.

Measuring the 0-60 time of your vehicle

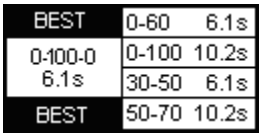
1. Install DriftBox into your vehicle as described in the 'Quick Start Guide' section of this manual.
2. Press the **MODE** button to select the Performance Mode.
3. Now use the ▲▼ buttons to scroll to the ACCEL screen. This screen shows 0-60 in the top right hand corner:



4. The left hand side of the screen shows your live velocity unless you are in an area of poor satellite reception in which case it flashes "LOW SATS".
5. Now perform your 0-60 acceleration run. As your vehicle goes over 60 mph the time will instantly show in the 0-60 section of the window.
6. If you come to a stop you will see that this time remains on view. The Vmax section will also show the highest speed you attained during this particular run:



7. You can now instantly start another 0-60 acceleration, as you pull away the screen will reset and show your new values as you cross 60 mph.
8. After doing a number of runs you can view your best 0-60 time by scrolling to the BEST screen.

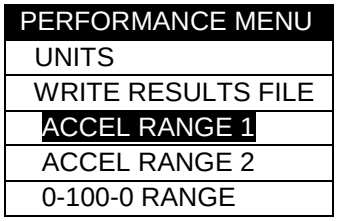


9. If you have your SD card inserted then your run data will be stored.
   Please note, to record a results file, you must accelerate over at least 30 Km/H.

Editing a Performance mode Test Range

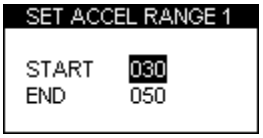
You can configure the two speed ranges of the Accel2 and Decel screen to your own custom tests.

If you wish to change the speed range over which performance is measured, press the **MENU** button from any of the performance mode screens and select the range you wish to change from the 'Performance Menu' and press **OK**

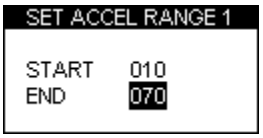


Example: Editing ACCEL RANGE 1

1. Highlight 'ACCEL RANGE 1' and press **OK**
2. The following screen will appear with the start speed of ACCEL RANGE 1 highlighted:



3. Whilst the START speed is highlighted use the ▲▼ buttons to change the speed.
4. Press **OK** and repeat this procedure for the END speed:

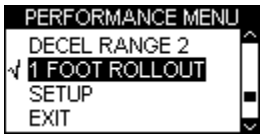


1 Foot Rollout

The DriftBox normally takes the start of a performance run at the point at which the vehicle moves, but at drag strips the vehicle starts 1 foot behind the timing start line. You can make the DriftBox start ***all timing runs*** from 1 foot by enabling this feature.

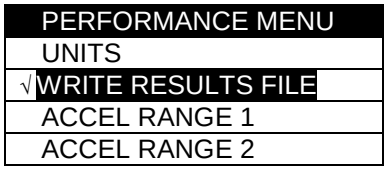
Enabling 1 Foot Rollout correction

- Press the **MENU** button to enter the Performance Menu.
- Highlight the 1 FOOT ROLLOUT option and press **OK**



Results Files

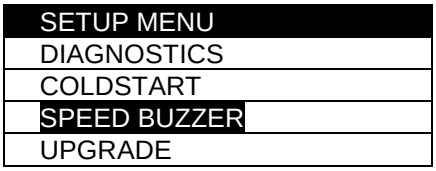
If an SD card has been inserted, DriftBox will create two results files on the card. The first file, 'Results.txt' gives the results for every performance test made using DriftBox. The second file, 'Best.txt', displays only the best results achieved for each type of test. Results text files are only created on the SD card if the 'Write Results File' option has been chosen from the Performance Mode Menu:



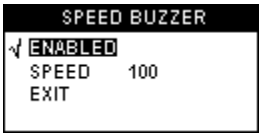
Speed Buzzer

The Speed Buzzer can be used in such tests as 0-100-0, as an audible warning when a certain speed has been reached. This means that during such testing the driver will not need to watch the display and can listen for the buzzer instead.

To change the speed at which the buzzer will sound, enter the **MENU** from any mode, scroll to Setup and click **OK**. The speed buzzer is one of the options in the Setup menu. Pressing either the ▲▼ alters the speed setting.



The speed buzzer will only sound once when the set speed is reached. It will not continue to activate every time the vehicle passes through the set speed, on acceleration or deceleration. In order to arm the speed buzzer once more the vehicle must either come to a complete halt for five seconds, or DriftBox must be power-cycled.



Event Marking

Pressing the OK button when in any of the Speed Mode screens will create an event mark in the logged file (see 'Event Marking' in the software section.)

Laptiming Mode

DriftBox can be used to measure lap times by storing the position of a virtual gate and using this to trigger the start and end of a lap. Further locations can be added to represent split and dedicated finish lines.

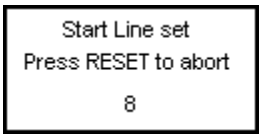
- **Start/Finish Line**: Defines the point at which one lap ends and another starts. It also defines the start of a test that ends in a different location, such as a sprint or slalom stage.
- **Split Line**: Defines a point on the track or stage at which intermediate time and speed measurements are displayed.
- **Finish Line**: Used only in point-to-point tests (such as sprint or slalom tests), to mark a finish point that is in a different location to the start point.

Measuring Lap times

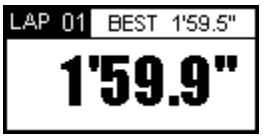
There are two ways of measuring lap times as you drive round a circuit: by setting the start/finish and split points through the DriftBox menu screens, or by using the 'Simple Lap Timing' option. The latter is useful if the user is in a situation where several button presses are difficult to achieve, such as during a qualifying run.

Simple Lap Timing

This method of lap timing requires just one button push to set up a start/finish line. With the DriftBox in Lap Timing mode, press either the up or down arrow key as you drive over the desired start/finish point. The screen will then display the following message:



The screen will then count down to 0 and revert to the normal lap timing screen:



If an arrow button has been pressed in error this count down allows you to abort the setting of the start finish line, whereupon the lap times will be calculated according to any previous start/finish points that may have been set.

As soon as the start / finish line is crossed again, lap timing will begin. The lap time will be displayed at the end of the second lap along with the current best time in the top right and the lap count in the top left of the screen.

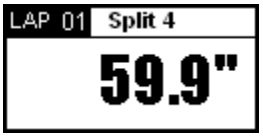
Lap Count

A count of the number of completed Laps is displayed in the top left corner of the Lap timing screen.
To reset the Lap count and the Best Lap time, press the RESET button.

Lap Timing Including Split Points

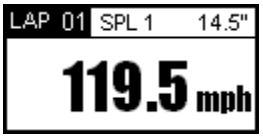
This method allows for the setting of a start/finish line, up to six split points, and a separate finish line if the course being driven is of a sprint or hill-climb type. Due to the fact that it requires several button pushes it is best employed in a non-race session.

- Firstly set the start/finish line and splits or load a previously saved set from the SD card (see Setting Start/finish and Split Lines below).
- If you want to save your lap times to a file, insert an SD card.
- Drive around the circuit, your times will automatically appear on the DriftBox display:



Big Speed @ Split display

There is a choice of what is displayed in the main area of the Lap timing screen, either your Lap/Split time, as shown above, or the Vehicle speed as it crosses a split point or start/finish line; with the current lap in the upper left and the split time in the upper right of the window:



If Split points are placed at the exit of corners then this mode displays the corner exit speed, which is a very easy way to help you improve your speed out of a particular corner. To display the exit speed at the last split instead of the time, press the **MENU** button, highlight 'DISPLAY OPTIONS' and press the **OK** button. Next, tick the 'BIG SPEED @ SPLIT' option.

DISPLAY OPTIONS
SPLIT DISPLAY TIME
SPLIT TO SPLIT TIME
√ BIG SPEED @ SPLIT
EXIT

Split to Split Time

There are two different ways of measuring split times. The default is from the start of the lap to the split, the other method is from one split to another. To change between these options, tick or un-tick the option 'SPLIT TO SPLIT TIME' in the DISPLAY OPTIONS menu.

DISPLAY OPTIONS
SPLIT DISPLAY TIME
√SPLIT TO SPLIT TIME
BIG SPEED @ SPLIT
ROLLING LAP TIME
EXIT

Split Widths

When setting a start / finish or split line, DriftBox will set the width of the line at a default value of 25m (12.5m either side of the point at which the OK button was pressed.) However this can be changed by selecting the Split Widths function and altering the value using the ▲▼ buttons. This feature is useful if DriftBox is being used on a track where separate sections pass closely by each other, and eliminates the possibility of going through a split line in the wrong direction.

Clearing your Best Lap time

Press and hold the **RESET** button for 1.5s.

Laptime Telemetry

COMMS MENU
INPUT MODULE
√ LAPTIME TELEMETRY
LAPTIME PULSE
DRIFT TELEMETRY
YAW DIAGNOSTICS
EXIT

The Laptime Telemetry option makes DriftBox send lap time data via the telemetry serial port whenever a start/finish, split line or dedicated finish line is crossed. The lap time serial stream has the following format, sent at a baud rate of 115200 bit/sec, no parity, 8 data bits and 1 stop bit.

Word No.		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
24	24																	85	9D
24	24																	49	8E
24	24																	B6	E7
24	24																	6B	17
24	24																	1B	7F
24	24																	FE	57
24	24																	45	85
ASCII Header																		**Checksum**	

Field	Value	Output	Conversion
ASCII Header:	0x2424	**$$**	ASCII
Message Length:	0x0010	**16** (No of 16 bits Words)	Hex2Dec
Message Type:	0x0010	**Laptime**	Hex
	0x000A	**Split 1**	
	0x000B...	**Split 2**	
	...0x000F	**Split 6**	
Last 3 Digits of Unit Serial No:	0x333434	**344**	ASCII
No. of Sats in View:	0x07	**7**	Hex2Dec
Laptime (Secs) * 100000:	0x0975E0	62000/100000 = **6.2**	Hex2Dec
UTC Time (Secs) * 100:	0x3F6018	4153368/100 = **41533.68**	Hex2Dec
Speed at this point * 100:	0x08A4	2212/100 = **22.12** mph or kmh*****	Hex2Dec
Checksum:	0x4585	**0x4585**	Hex

*****Speed output depends on units selected

Each telemetry message will be sent twelve times unless an acknowledge message is received.

Laptime Pulse

If the Laptime Pulse option is enabled, a 250ms pulse is output on the serial port instead of a serial stream.

Note that selecting either of these two options disables the other option. It is possible to deactivate both modes by un-ticking whichever option is currently selected, if any.

Split Output

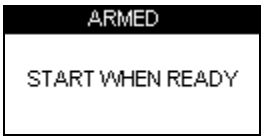
Similar to the Laptime Telemetry option, this enables split time data or a 250ms pulse to be output via the telemetry serial port whenever a split line is crossed. The output given will be the same type as the lap timing output, so if you have enabled Laptime Telemetry the split output will be in the Telemetry format; if you have enabled Laptime Pulse the split output will be in the Laptime Pulse format. If this option is disabled, no output will be given.

One Shot Mode

By default, DriftBox starts the lap time from a start / finish line. If you want to start the lap time from the moment you start moving, then you need to select 'One Shot Mode'. To set this mode:

- Press the **MENU** button to enter the LAP TIMING menu.
- Highlight 'ONE SHOT MODE' and press **OK** to activate.
- Bring the car to a halt at the start point (previously set using either set start/finish method.)
- After two seconds the following screen will appear:

- The screen will count down from 5 to 1 after it reaches 1 the following screen will appear:



- When this screen shows you can then start your lap. Timing of your lap will start as soon as you pull away and will then stop as you cross the start / finish line at the end of your flying lap.

Start / finish and split lines

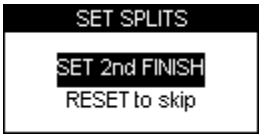
Before DriftBox can measure and display times, you will need to either load previously recorded start / finish lines or create new ones in your DriftBox. This is done using either Simple Lap Timing, mentioned above, which sets only a start / finish line. In order to set a start / finish AND split points, follow the instructions below.

Setting start / finish lines

- Press the **MENU** button to display the Lap Timing Menu.
- Highlight 'SET START & SPLITS' and press **OK**

- As you drive across the start / finish line press **OK**
- This will set the start / finish line and the screen will now show the SET SPLIT1 screen.

- To set the first Split, press **OK** when you pass this point or press **RESET** to skip.
- If you wish just to place a separate Finish line, press the '**RESET'** button to skip all the split points and scroll to the SET 2nd FINISH screen.



- Press **OK** to set a separate finish line as you drive over it.

Note: you must be moving to be able to set virtual lines.

Saving start / finish and Split Lines

After creating start / finish, Splits or Finish lines you can save them to a file on the SD card which can be loaded back into DriftBox at a later stage, or used in the VBox Tools software. The file created is called DBOX.DSF and is saved into the 'DATA' directory on the SD card. If a DBOX.DSF already exists the file will not be created; this is to prevent existing start and split lines being accidentally overwritten.

To Save the lines you have created:

- Ensure the SD card is inserted.
- Press the **MENU** button to enter the Lap timing menu.
- Highlight the SAVE SPLITS option and press **OK**

Loading start / finish and split Lines

You can load start and split line information from a file stored on the SD card into your DriftBox. By default the DriftBox looks for a file it has saved out; DBOX.DSF in the 'DATA' directory. If no DBOX.DSF file is found the DriftBox will look for a 'DSF' directory and display a list of all *.DSF files in that directory. This facility allows you to keep a library of split lines files on the DriftBox from multiple test areas or circuits.

To Load a split line file:

- Press the **MENU** button to enter the Lap timing menu.
- Highlight 'START & SPLITS' and press **OK**
- Highlight the 'LOAD SPLITS' option and press **OK**

Clearing start / finish and split Lines

This option will erase the split line information from the DriftBox memory, not from the SD card. Split line information remains in the DriftBox memory until they are either cleared or re-entered, even if the unit is power cycled.

- Press the **MENU** button to enter the Lap timing menu.
- Highlight 'STARTS & SPLITS' and press **OK**
- Highlight the 'CLEAR' option and press **OK**

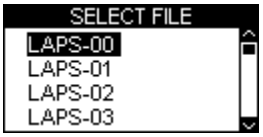
Recording and Reviewing Lap and Split Times

To record your run data and lap and split times, simply insert a SD card into DriftBox, the run data will be recorded in a '.dbn' file on the SD card and the Lap Time information will be recorded in a text file e.g. 'Laps-01'.txt'

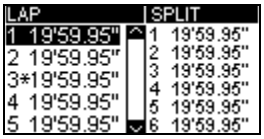
Using DriftBox to review lap times

To review a 'Laps-xx.txt' file with lap and split time data:

- Enter Lap Timing Mode and then press the **OK** button.
- DriftBox will then display any Lap Timing files stored on the card:



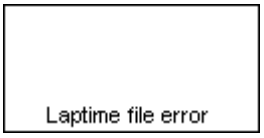
- Press the ▲▼buttons to scroll to the required file, then press the **OK** button to select it. The file will then be displayed in DriftBox:



In each file, the best lap is indicated with an asterisk. To change the lap for which split times are displayed, use the ▲ ▼ buttons to scroll between the laps; the split times will update automatically. Pressing the **OK** button in this screen will return you to the Lap Timing Mode's main screen.

Laptime File Error

If a file that does not contain any valid lap data, for instance if the car has only moved a few metres, then DriftBox will display this screen:



Using a computer to review lap times

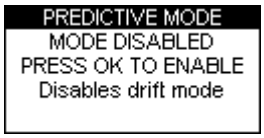
Any of the 'Laps-xx.txt' files can be opened using a text editor program such as notepad. The files have the following example format:

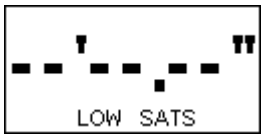
Time : 13:22:33
Date : 18/7/05

Lap	Lap Time	Split	Split Time
01		1	0' 10.20"
01		2	0' 11.45"
01		3	0' 22.50"
01		4	0' 8.30"
01		5	0' 19.25"
01		6	0' 8.70"
01	1' 28.35"		
02		1	0' 10.20"
02		2	0' 11.45"

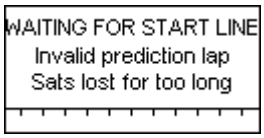
Predictive Mode

Predictive mode enables you to graphically view your predicted lap time. Predictive lap timing works by saving your position around a circuit, every second. If the current lap is the fastest so far, then this positional data is saved as a reference. With just one button push of an arrow key, you are able to set a start/finish line within predictive mode. Please Note; this will overwrite a start/finish line set in Laptiming mode.
By default, Predictive Mode is disabled. However, the user can enable Predictive Mode via the setup menu or pressing ok while viewing the mode screen.

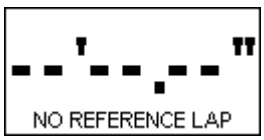




This message on screen means the DriftBox is receiving positional data from less than three satellites.

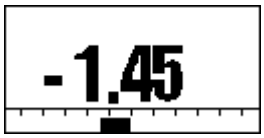


If the DriftBox loses satellite lock while predicting, this screen will appear. The user will have wait until the start finish line is crossed before predicting again.



Before Predictive mode can operate, you will need a reference lap. If a reference lap file is found on the SD card as the Drift Box boots up, it will be automatically be loaded. A reference lap file can be loaded from the SD card at any time using the **Load Reference** menu option. The Drift Box will display this screen when no reference lap is available. Once a Reference lap has been set, the Drift Box will start predicting when the start line has been crossed.

If you do not have a reference lap file, you will have to wait until a full lap of the circuit has been completed. This screen will be displayed while the DriftBox is creating a reference lap

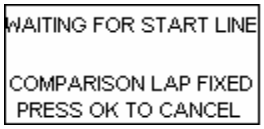


Once a valid reference lap has been created or loaded, the DriftBox will begin predicting. The prediction is shown in text and graph format which is a graphical representation of the amount of time gained or lost around the lap.

When a lap has been completed, your lap time is displayed for five seconds before reverting back to the prediction screen.

Fixed Lap

In predictive mode your reference lap will change if it is faster then the previous. Pressing the OK button will fix your current lap, preventing it from changing. Pressing OK again on the same lap, cancels the fixing. Pressing OK on a later lap will cause that one to be fixed.
If you decide to load a lap file from the SD card, it will automatically become the fixed reference lap.

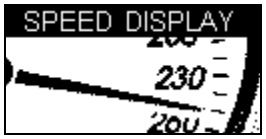


Anything that resets predictive mode will put the unit back in to normal non fixed predictive mode. This includes pressing the reset button, clearing splits or performing a power cycle.

You are able to set the scale of the bar display with each gradation representing a set number of seconds. The options available are 0-2s, 0-5s, 0-10s and 0-30s. This can be changed by selecting **MENU** and then **BAR RANGE**.

To save a reference lap, Press **MENU** and then select **SAVE REFERENCE**.
If you wish to clear your reference lap to enable you to create a new one, holding down the **RESET** button will allow to you to do so. Clearing the split points on Laptiming mode will also reset the reference lap. Please note, once you create a new reference lap, the previously saved one will be overwritten.

Speed Display Mode



The Speed Display Mode is divided into three screens. The first contains a compass and current speed in a large font, and will also give on-screen and audible notification of Points of Interest. The second is an Odometer and the third an Altimeter. Navigate between these screens by using the ▲ ▼ buttons.

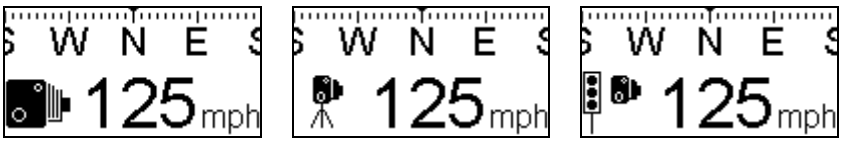
Points of Interest (POI)

In the Speed Display Mode, there is a 'Points of Interest' (POI) facility that can be used to indicate when the vehicle is near to a pre-determined geographical position. This option is active whenever the inserted SD card contains a valid.ov2 POI file. A common use of POI files is to store the location of safety cameras, but custom POI files can also be created to give locations of any other points that might be useful for testing purposes.

DriftBox will beep and display an icon on-screen whenever the vehicle moves within 250 meters of a POI, unless the vehicle is moving away from the POI.

The Points of Interest feature will only function if the correct POI files are present on the SD card. These files can be downloaded from various websites such as www.poihandler.com. The only file format recognised by DriftBox is the .ov2 type.

In order to display an icon when near a POI, the SD card must also contain a monochrome bitmap file no larger that 22 x 22 pixels with the same name as the corresponding .ov2 file. For instance: if a POI file named Filling_Stations.ov2 is present on the card and you wish to display a corresponding image when approaching one of the points of interest, the image file must be called Filling_Stations.bmp.

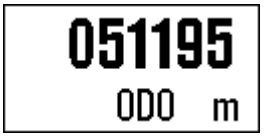


Warning:

If DriftBox is being used as a Safety Camera detector, note that this option is designed to make you aware of potentially dangerous areas where they may be in force. We do not guarantee that all of these areas are listed in any file you download. We accept NO liability whatsoever in the event that you receive a speeding fine through not being warned by this option on DriftBox. Nor do we guarantee the accuracy of the data either expressed or implied.

Odometer

In the Speed Display Mode pressing the ▼ button selects Odometer Mode. The total distance travelled in feet or metres (depending on units selected) will be displayed in the main window. Pressing the '**RESET'** button resets the Odometer back to zero.



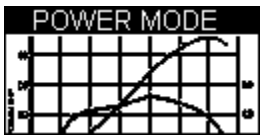
Altimeter

In the Speed Display Mode pressing the ▲ button selects Altimeter Mode. The current altitude in feet or metres (depending on units selected) will be displayed in the main window.

Event Marking

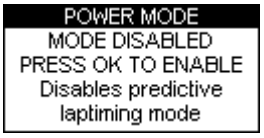
Pressing the **OK** button when in any of the Speed Mode screens will create an event mark in the logged file (see 'Event Marking' in the software section.)

Power Mode



Your car's power output can be measured using the Power Mode. There are two parts to this process: the acceleration run, which gives you the power at the wheels minus the losses caused by tyre and air resistance. The second part of the test measures these losses and also estimates gearbox losses. The Power Mode is also an additional tool for car tuning, where access to a chassis dynamometer is not possible.

Note that this is an estimation of power, and as such when carried out correctly will probably be within 5% of the true figure. It is very important that the test is carried out on a completely flat road and the correct procedure is followed very carefully. Power output can only be measured on a car with a standard manual gearbox.
By default, Power Mode is enabled. However, when Predictive Mode is enabled, Power Mode becomes disabled.

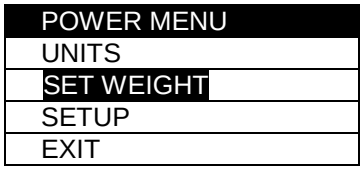


Power Testing

Please note that due to the nature of this test and the amount of space required, it is strongly recommended that such measurements are conducted on private roads.

Setting the Vehicle Weight

In order for accurate measurements to be made, the vehicle weight must first be entered via the Power Menu:

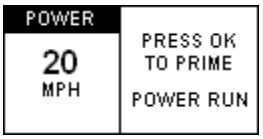


The weight you enter must be as accurate as possible - for best results have the car weighed prior to carrying out any tests as even a small inaccuracy will not give correct power figures, a 10% error in weight will give a 10% error in power. Use the ▲▼ buttons to increase or decrease the weight value (Holding down the buttons increments/ decrements faster). Altering the units from the menu will change the weight values from lbs to kg, and the power values from bhp to kw.

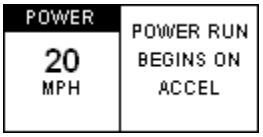
Power and losses runs should be carried out on level ground and always in the same direction, and it is recommended that power runs are conducted with the car in second gear.

Power Runs

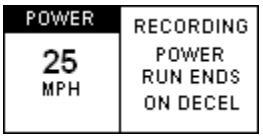
Once the vehicle weight has been set, a simple power run can be carried out to give engine output at the wheels. Put the car into second gear at a low RPM, 2000 RPM or less.



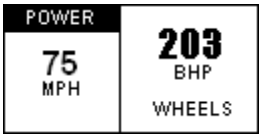
Press **OK**, the next screen indicates that DriftBox is ready to record the run:



Once the car begins to accelerate, the power is being recorded:



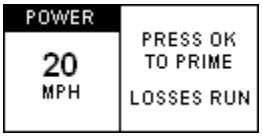
Accelerate to the top of the engine's rev range, disengage the clutch and make a note of the car's speed as this will be required during the losses run, then coast for a few seconds. DriftBox will record the amount of power as soon as it recognises deceleration:



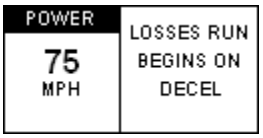
Calculating Losses

So as to estimate power output figures at the flywheel, you will need to configure the amount of loss generated by tyre and air resistance. To do this requires a 'coast-down' test. It is recommended that this is carried out in third gear.

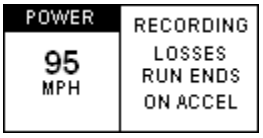
With the weight correctly entered, switch from the Power Run screen to the Losses Run screen using the ▲▼ buttons. The screen will display a similar initial instruction to the Power Run:



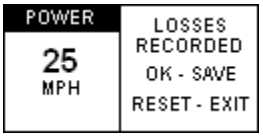
Begin to accelerate, and press **OK.** Continue to accelerate to the top of the engine rev range.



At the top of the rev range, disengage the clutch and put the gearbox into neutral. Once deceleration has begun the screen will display the recording information:

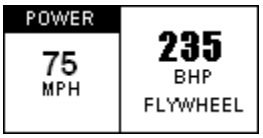


Let the vehicle coast down to a speed a long way below the speed at which maximum power is likely to occur, then accelerate briefly to finish the run:



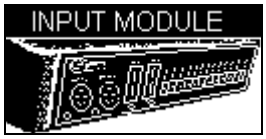
Press **OK** to save the losses; pressing **RESET** will cancel the recorded losses so that you can start the process again. Losses are permanently saved, but you should generally carry this out on the same piece of road in the same direction as your acceleration runs. Note any small gradient can have a large affect on the measurement.

If you have not carried out any power tests at this point then accessing the Power Run screen will simply display the priming instructions. If you have already carried out power runs the results will now be displayed as output from the flywheel rather than the wheels. Any further power runs will display the results at the flywheel, until the **RESET** button is pressed when in the Losses Run screen.



Pressing the **RESET** button when in the Power Run screen will clear the result in order for a new run to commence.

Input Module Screen



The Input Module screen provides the ability to configure the input and output channels of a connected Micro Input Module and view the data on each of the input module channels.

NB: This mode requires the RS232 chip upgrade in order to function.

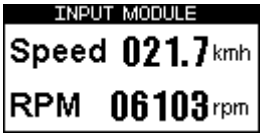
Input module connection

The DriftBox connects to a Micro Input Module using an RLCAB094 cable plugged into the Auxiliary connector on the back of the DriftBox to the DATA socket on the Micro Input Module. If an input module is connected to a DriftBox then it will automatically log all of the input module channels to the SD card.

Initialising the Micro Input module.

For DriftBoxes with firmware older than 3.0.17, In order for the unit to log the input module data channels, the Input Module screen must be accessed whilst the input module is connected and the DriftBox has satellite lock. After the Input Module screen has been accessed the screen will briefly display the following message.

Then the screen will display the data output diagnostic screen. Once this has happened the DriftBox will log the input module data. In firmware revision 1.4.76 and above a new display can be accessed by pressing down in this mode.



This screen displays Speed and a selected input module channel. To select an input module channel press the MENU button then navigate through the list to select display channel. From this screen any one of the MICIN01 channels can be selected.

NOTE: After each power up, the Input Module Screen on the DriftBox must be accessed in order for the DriftBox to recognise the presence of the MICIN01. After this has been done, then any of the DriftBox screens can be used, but this must be done or the MICIN01 channels will not be logged.

Configuring the Inputs and Outputs

See the Micro Input Module user guide for a full explanation of configuring the inputs and outputs of a Micro Input Module.

Data Logging

Providing that you have registered your DriftBox (see Quick Start Guide) then it will be capable of logging data to an SD.

Using the SD

Files logged by DriftBox are named 'DBOX_001.dbn', where 001 increments when a new file is created. A new file is created every time DriftBox is powered up, or when the card is re-inserted. If you wish to log data to the SD card then simply insert the card into the slot in the front of DriftBox. DriftBox will log vehicle position, speed and acceleration into a binary '.dbn' file which can be opened in DriftBoxTools software for analysis. This data is logged when velocity is above 0.5Km/h.

The DriftBox has two logging modes, selectable through the **SETUP** menu available from any screen.

- **ONLY WHEN MOVING:** In this mode GPS and DriftBox data is only logged to an SD card (.DBN file) whilst the Speed is greater than 0.5km/h.
  Only ever remove the SD card when you are stationary, otherwise you will risk losing data or corrupting the card (which would require a re-format).

- **CONTINUOUS:** In this mode all GPS and DriftBox data is logged to the SD card (.DBN file) regardless of Speed or satellite reception.
  Before removing the SD card, the data-logging process must be stopped by pressing the MENU button, which ends the writing of data to the card and closes the current file.

To read data from the card either insert the card into a SD card reader connected to your computer or connect your computer directly to DriftBox via the supplied USB cable to read the data from the card. DriftBox must not be writing to the card when you connect to your PC, so you must be stationary. To ensure Windows recognises a DriftBox, ***power up your DriftBox before connecting the USB cable to your PC***.

File types

Below is a list of the file suffix's and definitions that are used by DriftBox and DriftBoxTools Software:

Type	Definition
*.dbn	Binary format file containing logged Position, Speed, Acceleration data.
*.txt	Drift Scores and Lap times are stored in text format.
*.dsf	Split files containing Start/finish and Split line locations.
*.sct	DriftBox sector position information.
*.cir	Circuit overlay file for track mapping.
*.ov2	Binary Points of Interest file.
*.ref	Lap Reference file.

Connecting DriftBox to external devices

Drift Data output

DriftBox transmits live data on its serial port at the rear of the DriftBox when it is in Drift Mode. Any other devices with a serial input, such as a video overlay unit, can use this data. A serial output cable will be required (part number RLCAB032), please see the DriftBox website or contact your local supplier for details.

In Drift Practice Mode, the RS232 serial port outputs the following message at 115200bps at 10Hz intervals:

$DBOX,sss.s,±gg.g,±ll.l,±ddd.d,pp.p<CR><LF>

sss.s	= speed in kmh
±gg.g	= g-force in g (lateral)
±ll.l	= g-force in g (longitudinal)
±ddd.d	= drift angle
pp.p	= points

Note: ensure that the 'Sectors' option has not been selected, as the output when in this mode is different.

NMEA data output

When DriftBox diagnostic mode is active the DriftBox serial port outputs NMEA standard format GPS information. This makes it directly compatible for use as GPS input to mapping software programs for navigation use, such as Microsoft's Streets and Trips, Route 66 or similar software. A serial output cable will be required (part number RLCAB040), please see the DriftBox website or contact your local supplier for details. NMEA data is output at a baud rate of 4800bps.

Setup Menu

There is a single Setup Menu that is accessible in all of the DriftBox's modes.

To access the Setup Menu, press the MENU button in any mode and select the 'SETUP' option and press OK

The Setup Menu contains the following options:

SETUP MENU
LOGING MODE
PREDICTIVE MODE
COMMS MODE
SPEED BUZZER
ALIGNMENT
CONTRAST
BRIGHTNESS
DIAGNOSTICS
COLDSTART
UPGRADE
EXIT

Logging Mode

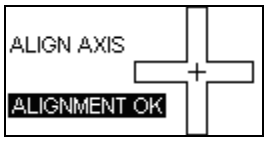
Allows the logging mode of the DriftBox to be configured, see the Data logging section of this manual for more information.

Predictive Mode

Press 'OK' to enable Predictive Mode. Note, if Predictive Mode is enabled, DriftMode and Power Mode are disabled.

Alignment

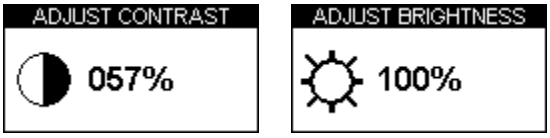
The alignment option allows you to perform a physical alignment of the internal motion sensors. It is important that you align DriftBox correctly whenever it is moved to a new position in your car or even to another car. To do this, park the vehicle on level ground and turn the engine off and select 'ALIGNMENT' from the SETUP MENU. Reposition DriftBox so that the two cursors form a small cross at the centre of the larger cross.



The two cursors do not have to line up perfectly, just make sure 'ALIGNMENT OK' appears.

Contrast & Brightness

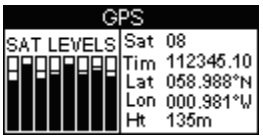
Use these to adjust the Brightness & Contrast of the screen, **OK** to return.



Diagnostic Screens

DriftBox has two different diagnostic screens, use ▲▼ to swap between the two.

GPS Diagnostic Screen

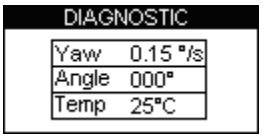


This screen allows you to view the following basic GPS information:

- Number of satellites being used by DriftBox.
- Signal strength of each satellite.
- Satellite time (UTC)
- Latitude.
- Longitude.
- Height (with respect to sea-level at Greenwich).

Note: In this screen data is logged to the SD card at 1Hz not 10Hz

Yaw-rate Sensor Diagnostic Screen



This screen displays the following information relating to the internal YAW sensor

- YAW rate in degrees per second.
- Angle (calculated from Yaw Rate)
- Temperature of the YAW rate sensor

Cold Start

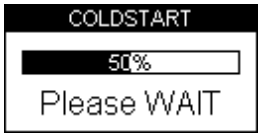
A cold start completely re-initialises the DriftBox's GPS engine. GPS coldstarts clear the GPS engine's list of satellite positions and configures the GPS engine for normal DriftBox operation. For this reason, coldstarts should be performed at the following times:

- If DriftBox has not been used for more than three weeks.
- If DriftBox has moved over very large distances (thousands of miles) whilst turned off.
- If DriftBox's firmware has just been upgraded.

Because each of these are common during distribution, it is also recommended that the DriftBox is coldstarted on its first use. After performing a Cold Start the vehicle to which DriftBox is connected should be left in an open area for at least 15 minutes, to re-acquire the satellite almanac. You should only need to do a cold start when you first receive your DriftBox, or you are experiencing poor satellite reception in an open area.

Performing a Coldstart

- Press the **MENU** button from any Display mode.
- Highlight the 'SETUP' option and press **OK**
- Select 'COLDSTART'
- The following screen appears and a coldstart is performed



When it is finished DriftBox will automatically go back to the Setup Menu.

Speed Buzzer

The speed buzzer is generally for use whilst in Performance Mode, during 0-100-0 style tests. The speed is configurable from this menu option – see the Speed Buzzer section under Performance Mode.

COMMS MENU

The Comms Mode specifies the current use and configuration of the main serial port on the AUX connector.

You are able to select the current Comms Mode in the Comms Mode submenu of the Setup menu. The default mode is input module.

COMMS MENU
INPUT MODULE
LAPTIME TELEMETRY
LAPTIME PULSE
DRIFT TELEMETRY
YAW DIAGNOSTICS
EXIT

Input Module

Sends an input module firmware version request at about 1Hz until a response is received. Thereafter it sends a data request on receipt of every GPS sample.

Laptime Telemetry

Sends a telemetry messag when a finish of start/finish gate is crossed. If 'SplitOutput' is enabled it will send a telemetry message when a split gate is crossed.

Laptime Pulse

Sets the lap time pulse for 0.25 seconds when a finish or start/finish gate is crossed. If 'SplitOutput' is enabled, it will set the lap time pulse for 0.25 seconds when a split gate is crossed.

Drift Telemetry

If in Drift Sectors mode and sector 1 start gate is crossed, the unit will send a telemetry message .
If in Drift Sectors mode and a sector end gate is crossed ;

If 'TELEM.FORMAT2' is not enabled the unit will send telemetry message 1
If 'TELEM.FORMAT2' is not enabled the unit will send telemetry message 7 and aslo write the information into a scores.log file.

If in Drift Practice mode (sectors not selected) the unit will output practice drift information at 10Hz shown below :

$DBOX,sss.s,±g.gg,±l.ll,±ddd.d,pp.pp

Yaw Diagnostics

Will output temperature, yaw rate and yaw calibration (offset and gain) as shown below.

01828,01763,1766.10, 6.82545
01828,01767,1766.10, 6.82545
01828,01762,1766.10, 6.82545
01828,01767,1766.10, 6.82545
01828,01769,1766.10, 6.82545
01828,01764,1766.10, 6.82545

Where:
temperature is corrected ADC count 2 + Calibration MinTemperature
yaw rate is corrected ADC count 3
yaw cal offset and gain are the current gain and offset being applied to calculate the yaw.

Upgrading the DriftBox Firmware

It may be necessary in the future for you to perform an upgrade to the firmware inside your DriftBox to add new features. Connect your DriftBox to the computer onto which you have installed the DriftBox software.

- Download the upgrade file from the website and save it to your computer.
- Press and hold the **MODE** button whilst you connect power to your DriftBox.
- This will force the DriftBox into Upgrade mode.
- Connect the USB lead from DriftBox to your computer.
- Double click on the upgrade file, this will auto run the upgrader software.
- If this doesn't happen automatically, run the 'Upgrader.exe' software, which should have been installed when the installation CD was used, and load in the relevant file.
- If you want to read your SD card through USB directly after this upgrade you will need to disconnect then reconnect power.

Troubleshooting

My DriftBox does not pick up or lock onto satellites
Some modern cars are fitted with a special windscreen that cuts down the amount of UV (Ultra Violet) rays that will be transferred through the windscreen which help cut down on glare. These windscreens are called Athermic, or UV Coated and will dampen/reduce GPS signals coming through the windscreen, so if you have an Athermic windscreen, it means you will not receive the same quality of signal as you would do by taking the DriftBox outside of the car.

How do I know if I have an Athermic Windscreen ?
You can either contact the manufacturer of your vehicle, or talk to the main authorised dealer who may be able to tell you. If you cannot receive a firm yes or no, then another way to check is to power up the DriftBox and hold it outside of the vehicle, receive a satellite fix and use the GPS diagnostic screen to see how many satellites you can see. Once you have noted this down, move the GPS inside the car and see if the GPS signal drops by 2-4 sats. If it does immediately then you probably have an Athermic windscreen.

There is list of cars in the table below that we believe have had Athermic windscreens fitted throughout part of their history. Please note that manufacturers don't always use the same windscreens through the life of a car model, so even though a model may be listed below, it does not necessarily mean that the current model that you have may have an Athermic windscreen. If you are unsure, try the above test or talk to your car manufacturer/dealership.

BMW 3 Series	Ford Mondeo	Renault Laguna
BMW 5 Series	Fiat Multipla	Renault Clio
BMW 7 Series	Mercedes W220-S Class	Renault Master
BMW X5	Mercedes Vaneo	Renault Kangoo
Citreon Picasso	Peugeot 206	Renault Scenic
Citreon C5	Peugeot 306	Renault Espace
Citreon Xsara	Peugeot 307	Renault Megane
Citreon Xantia	Peugeot 607	Renault Safrane
Ford Galaxy	Renault Traffic	Vauxhall Zafira

If your car does have this type of windscreen you will need to use an external GPS antenna that magnetically fixes to the roof of your car. An external antenna is available as an optional extra - see the website for details.

If you still have reception problems:

- Obstructions to the open sky will reduce GPS performance. Try to ensure placement of DriftBox is away from the windscreen edges so it has the widest view of the skies possible. With an external antenna place it away from roof bars and at least 10 cm way from any other roof mounted items.
- Driving in built up areas and close to tall trees reduces satellite reception.
- DriftBox may require a Coldstart, see the DriftBox setup section of this manual for more information.

DriftBox displays a drift angle when the vehicle is not drifting

- Values of Drift up to 10^{o} can be expected on a normal corner without drifting.

DriftBox displays an angle > 10^{o} when the vehicle is not drifting

- Check the 'Alignment' of the DriftBox; see the alignment section of Setup Menu in this manual for further information.
- If the road has a severe camber / gradient this will slightly affect the Drift angle calculation.
- If you are in an area of poor reception quality then this will affect the Drift angle calculation.

The Drift angle reading appears too big or too small

- Check the 'Alignment' of DriftBox; see the alignment section of Setup Menu in this manual for further information.
- If the road has a severe camber or gradient this will affect the Drift angle calculation.
- If you are in an area of poor reception quality then this will affect the Drift angle calculation.
- If the Drift angle is consistently incorrect in good conditions then the YAW sensor may need to be zero'd, but this is very unusual.

To check whether you need to zero the YAW sensor:

Use the Yaw sensor diagnostic screen and sit DriftBox very still on a flat surface. The angle reading will change slowly over time. If the angle changes every three seconds or less, go to the Diagnostic screen, press and hold the **RESET** button for two seconds then follow the on-screen instructions. The process will take thirty seconds, during which the unit must be kept very still. If the sensor is subjected to a sudden movement, the procedure will be cancelled.

Note: If you wish to cancel the procedure, press any key other than **OK** to return to the diagnostic screen.

The Alignment Bars are in the wrong position when DriftBox is held flat

If the horizontal and vertical alignment bars, which are used as a guide to correctly align DriftBox in the windscreen, are no longer positioned correctly when DriftBox is held on a flat surface they may need resetting. To do this, hold DriftBox very still on a flat surface when in this screen, and press and hold reset. The alignment bars will then be repositioned in the middle of the DriftBox display and can once again be used as a guide to DriftBox alignment.

No data files are appearing on the SD card

Make sure the SD card is not full. If your DriftBox does not beep twice when you insert the card, then you may have to re-format the card - you should use the utility in DriftBox Tools. If purchasing a new SD card, ensure that it is of high quality from a reputable manufacture

DriftBox Tools Software

The DriftBox Tools software allows you to view the driving data recorded by DriftBox in a '.dbn' file. The software also allows you to display Lap times, Acceleration, Deceleration and Drift results, and to carry out detailed analysis of driver and vehicle performance.

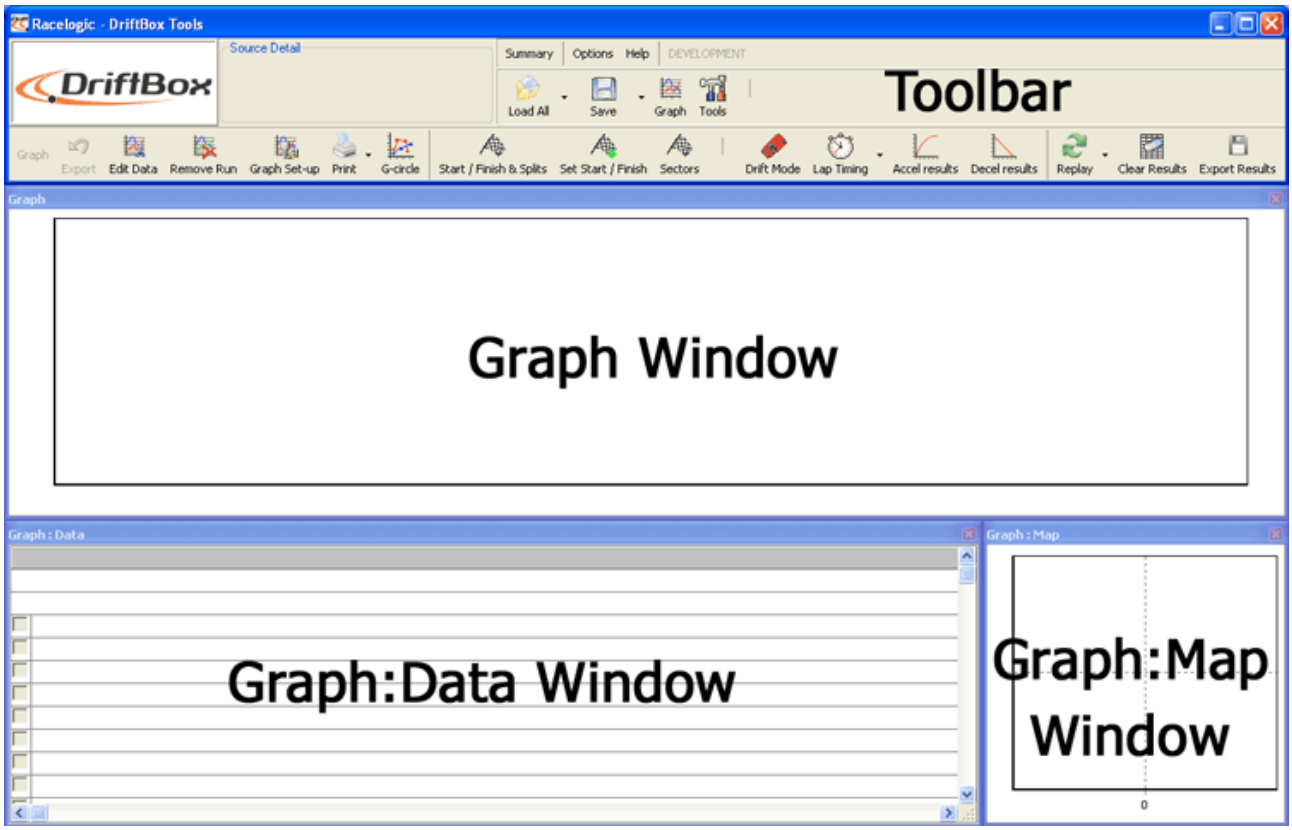
Installation

Each DriftBox is supplied with a CD containing the DriftBox Tools software. Insert the CD into your computer, the installation should then auto run. The Installation will place a shortcut onto your desktop for the main analysis software, and also install USB drivers for upgrading your DriftBox. The software installation is also available from the downloads section of the DriftBox website, along with the current firmware release.

DriftBox Tools Windows

DriftBox Tools is made up of several windows, each displaying a variety of data in both a graphical and textual form.

When the software is started for the first time after installation, and before any files have been loaded, the windows visible will be the Toolbar, the Graph screen, the Graph:Data screen, and the Graph:Map screen:



There are additional windows that can be displayed, according to the functions being employed to analyse your data – these will be described in subsequent sections of this manual.

Graph Window

In the Graph window different channels can be plotted, either against time or against distance, and up to four '.dbn' files can be overlaid on the graph. The Graph window can display large amounts of data at once, with the addition of various axes to aid analysis.

Graph: Map Window

The Graph: Map window shows the path of the vehicle, calculated from the latitude and longitude data. In addition, a circuit overlay can be applied to the map window, allowing you to see the position of the vehicle in relation to the bounds of a track.

Graph: Data Window

The Graph: Data window shows a table of the data of the following available channels:

- Speed
- Lateral Acceleration
- Longitudinal Acceleration
- Heading
- Height
- Satellites
- Yaw Rate
- Latitude
- Longitude
- Brake Trigger
- UTC Time
- Distance
- Time
- Radius of Turn
- Drift

There are a number of other channels which are shown, but these are not relevant to the DriftBox and will be blank. For reference, these channels are: Relative Height, Vertical Speed, Glonass Satellites, GPS Satellites, Lat Acc from Yaw Rate, DGPS, Speed Quality, Centre Line Deviation, Solution Type, and RMS Error Position.

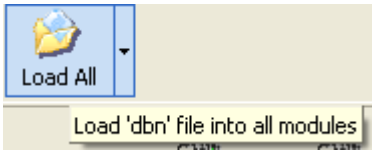
Window Sizes and Positions

Each of the three display windows can be resized by stretching the window (by holding the mouse pointer over a window corner and then click-dragging when the pointer shape changes to ⤡); each window can be repositioned; and all of these windows can be printed. The default position and size of each window can be reset from a function in the Tools menu called 'Arrange Windows' (see page 78.)

Software Basics

Opening DriftBox Files – Load All

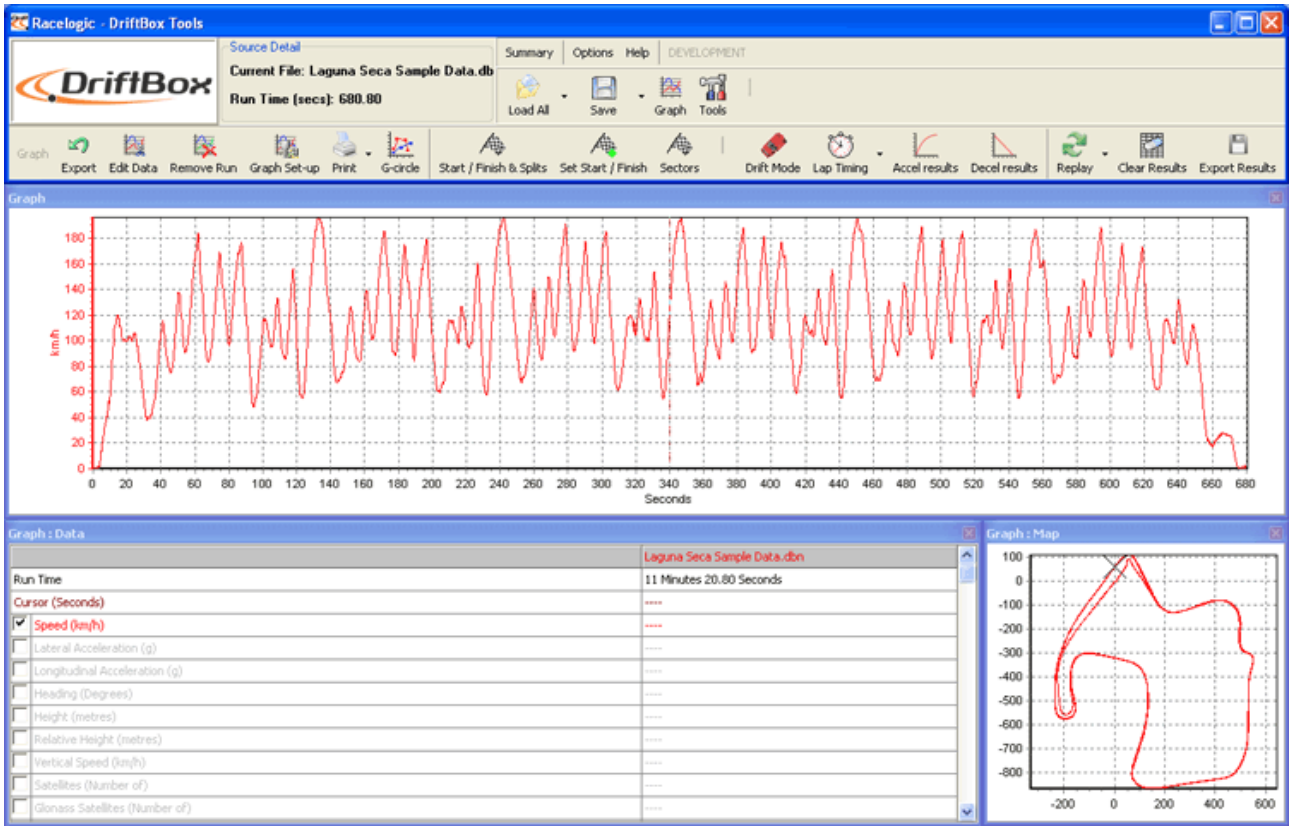
To load a file that has been recorded by your DriftBox, click on the Load All button on the Toolbar. An 'Open' window will appear – navigate to the directory on your PC that contains your DriftBox files and select the file you wish to view.



By default the 'Files of Type:' will be 'DriftBox Binary Files (*.dbn)', with a further option of 'VBOX Data Files (*.vbo)'. Unless you are loading files that have been recorded using Racelogic VBOX equipment you will not need to select the .vbo file type.

Data Display

Once a file has been loaded the three windows will each display some information, as described in DriftBox Tools Windows on page 45.



Note how in the example above the Graph window is showing speed in Km/h (Y axis) and time in seconds (X axis); the Graph:Map shows the path the vehicle took whilst the file was being recorded (in this example the Laguna Seca circuit in the United States); and the Graph:Data window is displaying values from the file according to the position of the cursor in the Graph window.

The Toolbar displays the file name and total run time next to the DriftBox logo.

Graph Set-up

The Graph Set-up button brings up a list of options that apply to all three of the main windows, and can also be brought up by right-clicking on any of the three main windows. Each function is described in further detail in the following sections.

Moving Around the Graphs

Once a file is displayed the data from the file can be examined more closely using the following basic functions: zoom, pan and cursor movement.

Cursor

The position of the cursors in the Graph and Graph:Map windows are linked and move together, and the values displayed in the Graph:Data window update as the cursor is moved through the file. The left and right arrow keys control the movement of the cursor. If the shift key is simultaneously pressed then it moves faster across the screen; if the ALT key is simultaneously pressed then it

moves through the file one sample at a time (one-tenth of a second.) The cursor can also be placed in the graph window by left-clicking the mouse button at the desired cursor position.

Zoom

Zooming in on the data in the graph or map window can be done three ways.

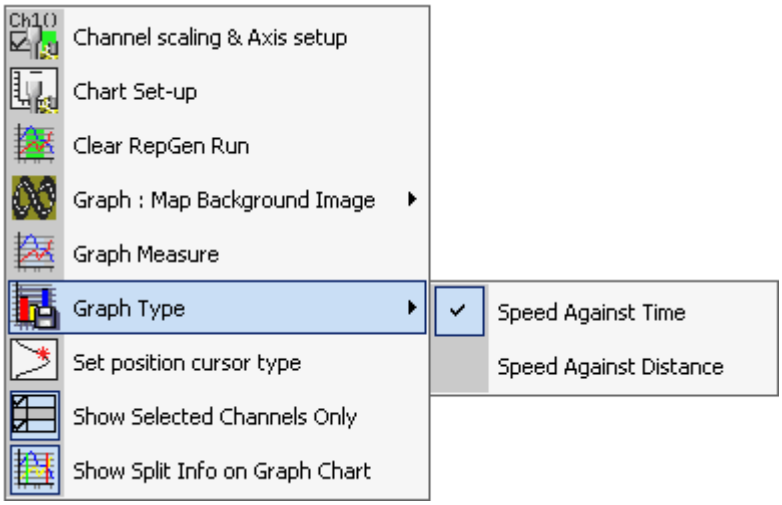
- Use the **left mouse button** to click and drag a window from ***left to right*** around the area of interest. Click and drag from ***right to left*** to zoom out.
- Use the **up and down** arrow keys on the keyboard to zoom in around the current cursor position. Pressing the shift key at the same time makes the zoom happen in bigger steps.
- If your mouse has a scroll wheel then this can be used to zoom in around the current cursor position. Pressing the shift key before using the mouse roller ball will make the zoom occur in bigger steps.

Pan

To pan the view in the graph or map window, put the mouse over the area you wish to pan then click and hold the **right mouse button** and move the mouse in the direction that you wish to pan.

Graph Screen X Axis

To swap the X axis from Time to Distance either press the right mouse button anywhere on the screen or click the ‘Graph Set-up’ icon, then select ‘Graph Type’, then choose one of the two options, ‘Speed Against Time’ or ‘Speed Against Distance’.



Speed against distance is useful for overlaying laps with different lap times around the same circuit (eg. different time, but same distance)

Speed against time is useful for examining performance files (acceleration and deceleration.)

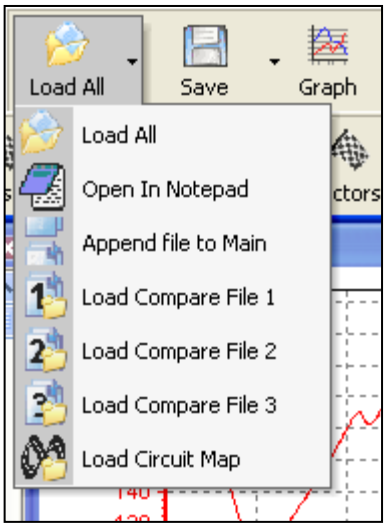
Graph Screen Y Axis

The default view on the Y axis is for speed, in either MPH or KMH. More axes can be added to either side of the graph screen – see ‘Channel and Axis Setup’ on page 53.

Additional File Functions

By clicking on the small arrow next to the Load All button, a further set of file-loading options is revealed:

Load Compare File



The Graph screen has the facility to load up to three more files for comparison. Select one of the 'Load Compare File x' items and choose an additional file to examine: the data will be overlaid in the Graph screen, another data set will be displayed in the Graph:Data window, and the comparison file's path will be overlaid in the Graph:Map window.

To remove a compare file, click on the 'Remove Run' icon in the Toolbar and then select the relevant file to remove.

Append File to Main

DriftBox files can be joined together using the 'Append file to Main' option. This is a useful feature if you want to join track sessions together in order to carry out lap time analysis on a whole day's circuit practice, or to view an entire journey which was punctuated by stops.

Appending a file will join the beginning of the additional file to the end of the main file. If you wish to append files to the middle of the main file it will be necessary to manipulate the main file first using the Edit Data functions (see Editing a DriftBox File.)

Note that if you have loaded a comparison file, this will be removed when appending an additional file to the Main Run.

Open in Notepad

A DriftBox file can be opened in Notepad by selecting the 'Open In Notepad' option from the 'Load All' drop down list. Note that for large files, it may take some time for Notepad to load all of the lines of data.

This function can also be used to open the other text files on your SD card such as the lap time results files, Results.txt and Best.txt.

Load Circuit Map

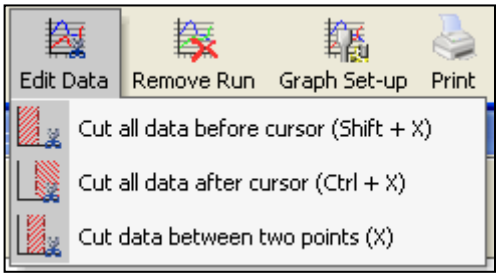
This feature allows you to load a circuit overlay file in addition to your logged DriftBox data, and is covered in the section 'Circuit Overlays' on page 69.

Editing DriftBox Files

Sections of a DriftBox file can be removed using basic editing commands accessed through the 'Edit Data' icon in the Graph screen toolbar. Note from the screenshot below that each editing function has a keyboard shortcut.

Cut All Data before Cursor

This feature removes the entire file up to the cursor position in the main memory (ie not any compare files currently loaded) only. You can use this to select an area of the graph you are interested in and then save just a portion.

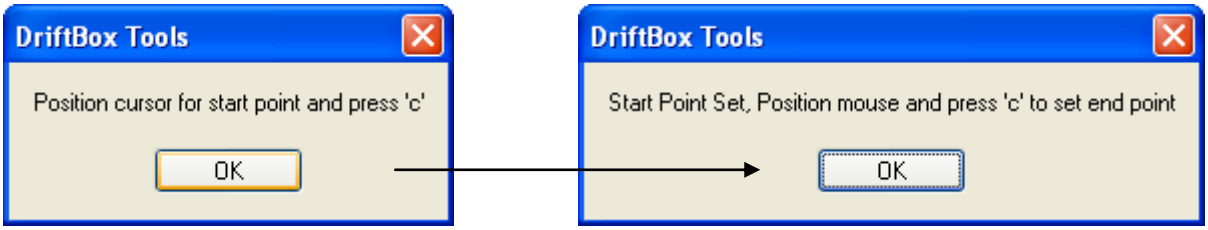

Edit Data
Remove Run
Graph Set-up
Print
Cut all data before cursor (Shift + X)
Cut all data after cursor (Ctrl + X)
Cut data between two points (X)

Cut All Data after Cursor

This feature removes the main memory file from the point of the cursor onwards.

Cut Data between Two Points

This feature removes a section of the main memory file between two specified cursor points. When choosing this option instructions will appear on the screen:


DriftBox Tools
Position cursor for start point and press 'c'
OK
DriftBox Tools
Start Point Set, Position mouse and press 'c' to set end point
OK

Saving DriftBox Files

Save a file by clicking on the 'Save' icon in the main toolbar. If you have made changes or edited your DriftBox file it is wise to save this file to a new name so that you do not lose the original file.

A .dbn file can saved in three alternative formats:

- Circuit overlay file (.cir): a file created to display the bounds of a circuit, for drive-line analysis.
- VBOX data file (.vbo): essentially the same as a .dbn, but in ASCII rather than binary format.
- Comma-delimited spreadsheet file (.csv): a raw data spreadsheet file, with all logged information in channel columns.

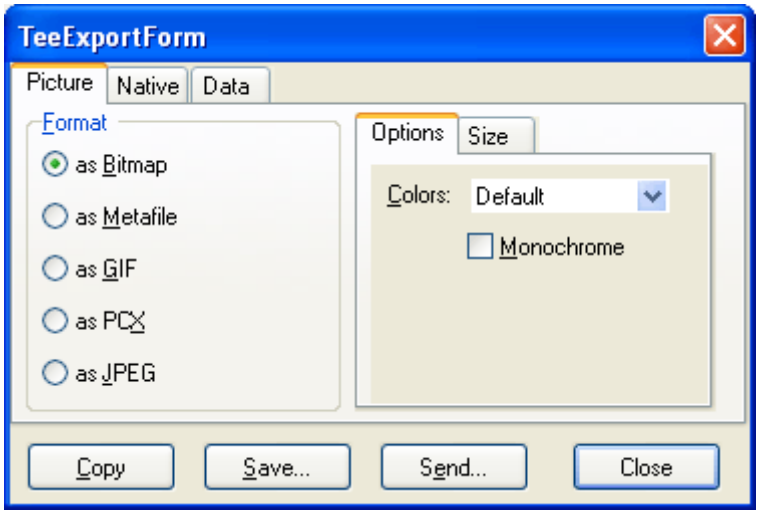
Printing Graph Data

You may print out the graph data currently being displayed by selecting an option from the 'Print' icon's drop-down list. It is possible to print a single window (Graph, Data or Map) by selecting the relevant options, or all three by selecting the 'Print' option (or by clicking the 'Print' icon itself, rather than its arrow.)

Exporting Graph Data

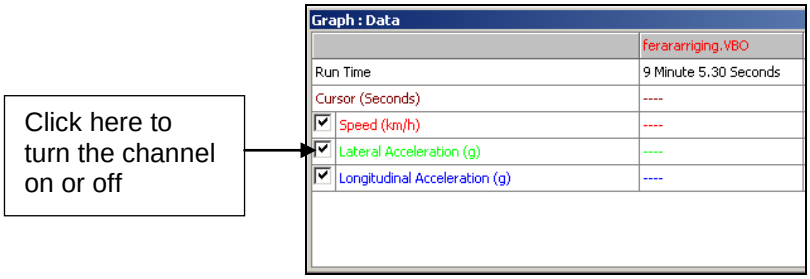
It is possible to export the graph or map as a picture file, which can either be saved or copied onto the computer's clipboard for use with other software. Simply click the 'Export' icon and then choose

the image to export. A dialogue box will appear that will allow you to choose several factors, including the format in which you wish to export the file:



Selecting Channels

All channels logged by DriftBox appear in the data window; all except speed are initially greyed out, but the data can still be seen. To enable a particular channel and make it visible in the Graph window, click in the tick box to the left of the channel name. For example, to display lateral acceleration:



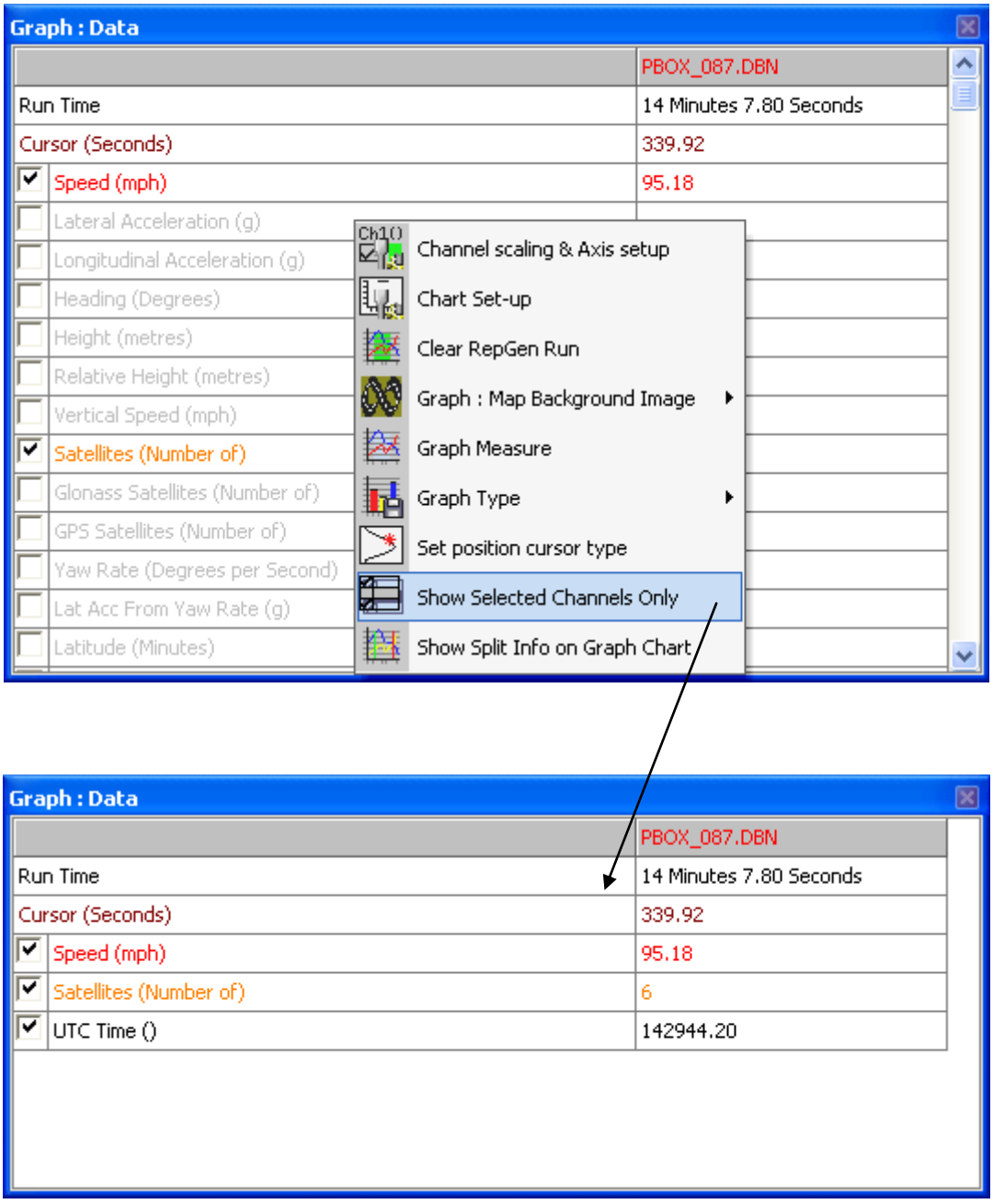
DriftBoxTools will automatically scale the channel to its minimum and maximum values and show it in the graph window. The enabled channel will then be highlighted in its display colour.

The data table contains all of the logged channels from the DriftBox file plus Lateral and Longitudinal Acceleration and Radius of Turn channels, calculated when the file is first loaded. Scroll up and down the channel list to find the desired channel.

A channel can also be found by typing the first letter of the channel, for example **'S'** for Satellites, providing that the data table is the currently active window. If there is more than one channel that starts with the same letter then press the key again until the software stops on your desired channel.

Show Selected Channels Only

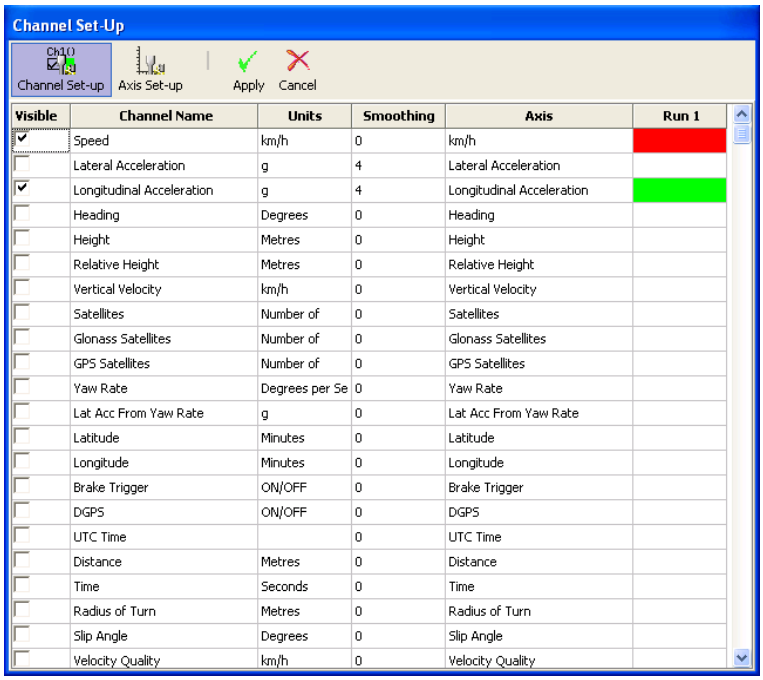
The data table channel list can be reduced to show only the ticked channels, by right-clicking the mouse pointer in any 'graph' window (Graph, Data, or Map) then selecting 'Show Selected Channels Only'. This is very useful when you are moving the cursor through the graph window and wish to see the displayed channel's data at the cursor point:



Channel and Axis Setup

For each channel there are a number of attributes that can be configured, including those relating to the y-axis. These are configured in the Channel Set-up and Axis Set-up screens, which are accessed by double-clicking on any of the channels in the data table or by right clicking the mouse button and selecting the 'Channel scaling & Axis setup' option, or by clicking the 'Graph Set-up' icon on the Toolbar.

Channel Setup



Visible	Channel Name	Units	Smoothing	Axis	Run 1
✔	Speed	km/h	0	km/h	
	Lateral Acceleration	g	4	Lateral Acceleration	
✔	Longitudinal Acceleration	g	4	Longitudinal Acceleration	
	Heading	Degrees	0	Heading	
	Height	Metres	0	Height	
	Relative Height	Metres	0	Relative Height	
	Vertical Velocity	km/h	0	Vertical Velocity	
	Satellites	Number of	0	Satellites	
	Glonass Satellites	Number of	0	Glonass Satellites	
	GPS Satellites	Number of	0	GPS Satellites	
	Yaw Rate	Degrees per Se	0	Yaw Rate	
	Lat Acc From Yaw Rate	g	0	Lat Acc From Yaw Rate	
	Latitude	Minutes	0	Latitude	
	Longitude	Minutes	0	Longitude	
	Brake Trigger	ON/OFF	0	Brake Trigger	
	DGPS	ON/OFF	0	DGPS	
	UTC Time		0	UTC Time	
	Distance	Metres	0	Distance	
	Time	Seconds	0	Time	
	Radius of Turn	Metres	0	Radius of Turn	
	Slip Angle	Degrees	0	Slip Angle	
	Velocity Quality	km/h	0	Velocity Quality	

Column descriptions:

Visible

The tick boxes in this column switch individual channels on or off in the graph window.

Channel Name

This column contains the names of the available channels.

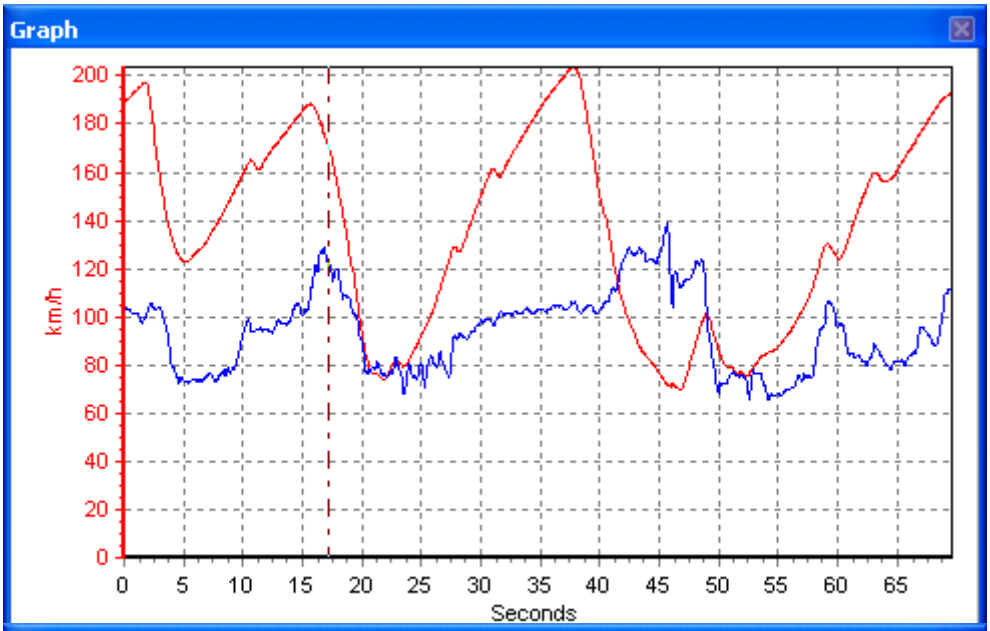
Units

Shows the units of each of the available channel.

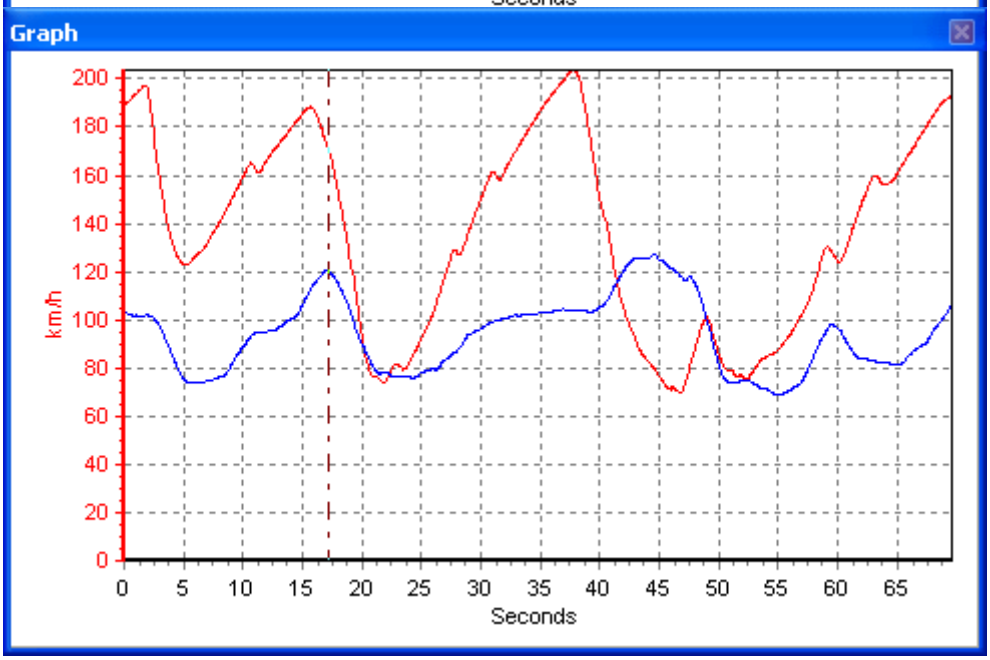
Smoothing

In this column a smoothing level can be applied to each channel individually. This can be useful for the Longitudinal and Lateral Acceleration channels. The smoothing level number directly relates to the number of samples used in the smoothing routine – the higher the value the smoother the trace will appear on the screen, but it will become less representative of the response of the vehicle as it was actually recorded:

The example on the right shows the Lateral Acceleration channel with a smoothing level of 2.



This example shows the Lateral Acceleration channel with a smoothing level of 25 – note how the individual peaks and troughs are no longer present, so the true dynamic values of the vehicle are now not shown. Smoothing Level should therefore be carefully applied – too little and the data can be too 'noisy' for easy analysis; too much and valuable information can be lost.



Axis

Displays the axis with which the channel is associated. To change the associated axis, click the mouse in the right hand end of the axis box once the channel has been made visible. A common application for this is to display both the Longitudinal and Lateral Acceleration channels, but to have them referring to one axis only:

Visible	Channel Name	Units	Smoothing	Axis	Run 1
☑	Speed	mph	0	mph	
☑	Lateral Acceleration	g	0	Lateral Acceleration (g)	
☑	Longitudinal Acceleration	g	0	Lateral Acceleration (g)	

Run 1

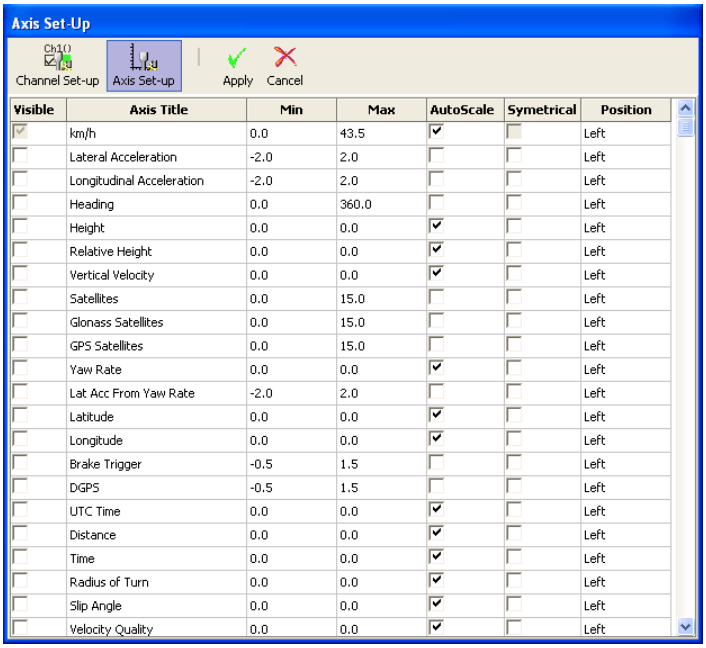
This column shows the selected colour for each active channel. To change the colour click on the colour box of the channel and select a new colour from the colour selection box that appears. The colour chosen will also be applied to the axis, should this be selected; for example, if the Lateral Acceleration channel is used in green, so too will the Lateral Acceleration axis, if it is used.

If compare files are also loaded then Run2, Run3 etc columns will be present in which the colours of these compare file channels can be set:

Visible	Channel Name	Units	Smoothing	Axis	Run 1	Run 2
☑	Speed	mph	0	mph		
☑	Lateral Acceleration	g	0			

Axis Setup

The Axis Setup window contains all the controls needed for assigning and configuring the y-axis of the Graph screen:



Visible	Axis Title	Min	Max	AutoScale	Symetrical	Position
☑	km/h	0.0	43.5	☑	☐	Left
☐	Lateral Acceleration	-2.0	2.0	☐	☐	Left
☐	Longitudinal Acceleration	-2.0	2.0	☐	☐	Left
☐	Heading	0.0	360.0	☐	☐	Left
☐	Height	0.0	0.0	☑	☐	Left
☐	Relative Height	0.0	0.0	☑	☐	Left
☐	Vertical Velocity	0.0	0.0	☑	☐	Left
☐	Satellites	0.0	15.0	☐	☐	Left
☐	Glonass Satellites	0.0	15.0	☐	☐	Left
☐	GPS Satellites	0.0	15.0	☐	☐	Left
☐	Yaw Rate	0.0	0.0	☑	☐	Left
☐	Lat Acc From Yaw Rate	-2.0	2.0	☐	☐	Left
☐	Latitude	0.0	0.0	☑	☐	Left
☐	Longitude	0.0	0.0	☑	☐	Left
☐	Brake Trigger	-0.5	1.5	☐	☐	Left
☐	DGPS	-0.5	1.5	☐	☐	Left
☐	UTC Time	0.0	0.0	☑	☐	Left
☐	Distance	0.0	0.0	☑	☐	Left
☐	Time	0.0	0.0	☑	☐	Left
☐	Radius of Turn	0.0	0.0	☑	☐	Left
☐	Slip Angle	0.0	0.0	☑	☐	Left
☐	Velocity Quality	0.0	0.0	☑	☐	Left

Column descriptions:

Visible

Each tick box in this column switches an individual **axis** on or off in the graph window.

Axis Title

Shows the title of each available **axis**. The axis title is edited by clicking on the box and entering a new name.

Min / Max

The Min and Max boxes allow the scale ranges for each axis to be set.

Autoscale

The autoscale option causes the axis scales to automatically fit the minimum and maximum values of the loaded channel.

Symmetrical

This option will cause the positive and negative maximum values on the axis to be the same magnitude. The magnitude of these will be determined by the largest positive or negative value of the channel.

Position

This option controls whether the channel axis appears at the left or right of the Graph window.

Analysing Your Data in DriftBox Tools

DriftBox Tools has three main features which will allow you gather results from data you have logged. Many of these results are available to view on the DriftBox itself, but the software allows for more detailed analysis and the replaying of data.

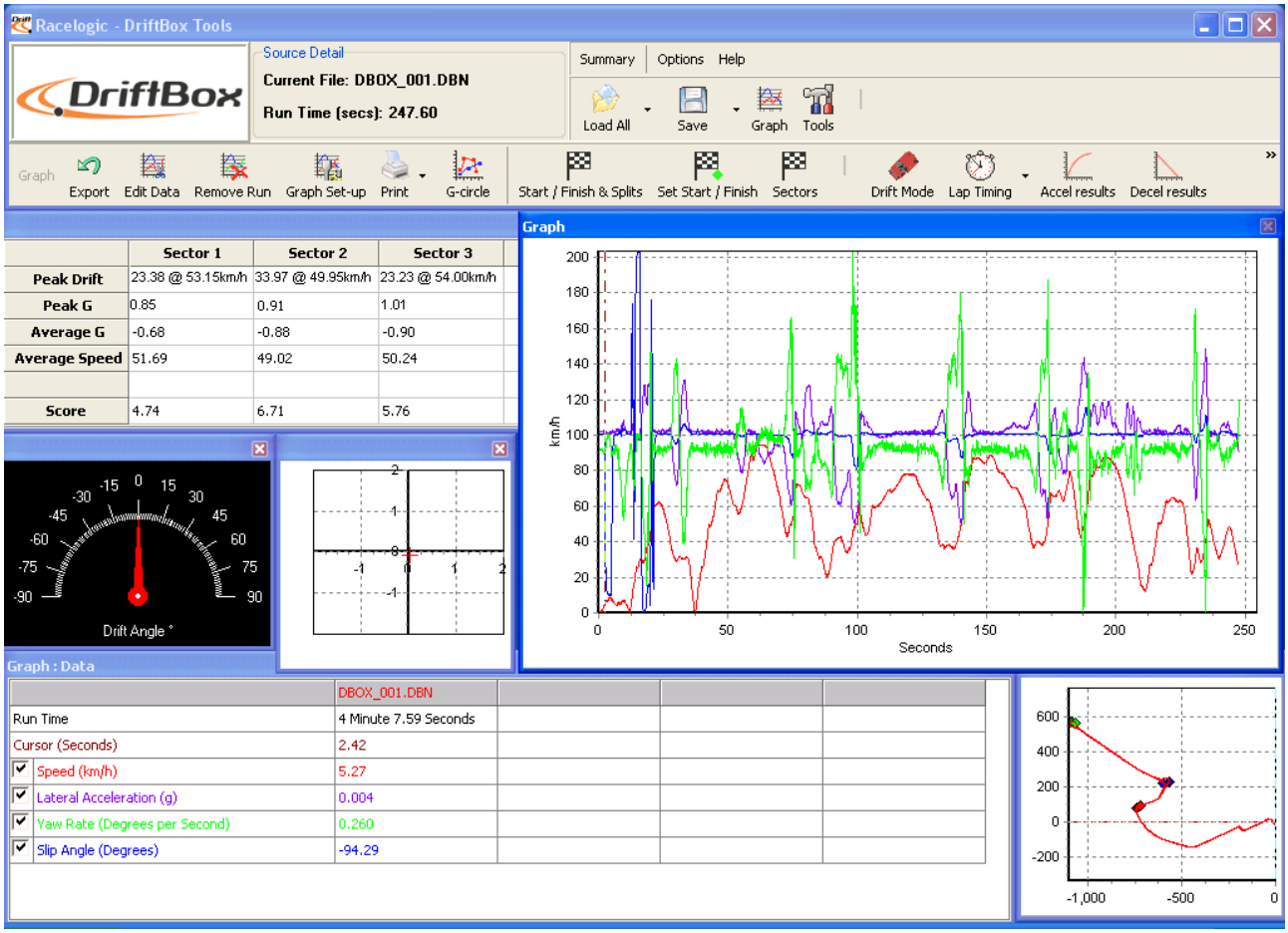
This section is divided into three subject areas: Drift Results, Lap Time Results, and Performance (ie Accel/Decel) Results. It also describes additional features which enhance the analysis but which have uses within each main function, such as the G-Circle.

Drift Results

Pressing the Drift Mode button in the Graph Screen toolbar causes the software to scan the loaded file and apply loaded sector file information to produce Drifting data:

- Peak Drift angle
- Peak G
- Average G
- Average Speed

A G meter and Drift meter window also appear when the Drift Mode button is pressed.



Sectors

Before you can display any Drift results you need to set up sectors.

Defining Drifting Sectors in DriftBox Tools

Each sector that you set requires that you define a start line and an end line. Each sector is numbered from 1-6.

Setting sector Start

- Move the cursor in the Graph window to the start point of the sector.
- Press the key **'1'**
- A green dot will appear at this position in the Map window

Setting sector End

- Move the cursor in the Graph window to the end point of the sector.
- Press SHIFT + **'1'**
- A red dot will appear at this position in the Map window.

To define other sectors use the **'2', '3'** etc. buttons.

Loading and Saving Sectors

Saving

Click on the 'Save' option in the Sectors drop down menu to save to the sectors created in the Graph screen to a '.sct' file.

Loading

Click on the 'Load' button in the Sectors drop down menu. You can then browse for a previously generated sector file containing sector information.

Clearing Sectors

If the current sector information in the graph screen needs to be cleared from the background memory and display screens, select 'Clear All' from the 'Sectors' menu in the Graph screen toolbar, or press SHIFT + '**C**'.

Displaying Drifting Results

To extract and display Drifting results from a file press the Drift Mode button in the Graph screen toolbar. This causes the software to scan the loaded file and apply loaded sector file information to produce a Drifting data grid showing the following data:

- Peak Drift angle
- Peak G
- Average G
- Average Speed

A G meter and Drift meter window also appear when the Drift Mode button is pressed. When the replay facility (see below) is used to replay the loaded file, the G and Drift angle windows display data from the file that corresponds to the cursor position as it moves through the replaying data.

Displaying Drifting Data from a Logged file.

- Click the Load all button to load a DriftBox file into the DriftBox Tools software.
- Set up sectors as described above, or load a sector (.sct) file.
- Press the Drift Mode button to scan the file and display results.

Replaying DriftBox Data

A DriftBox file can be replayed at real time speed, or at 2 x or 5x real time speed.

Replaying a file:

- Load the file into the DriftBoxTools software using the ‘Load All’ button.
- Then click the right arrow of the Replay button on the Graph screen toolbar to view and select on of the replay speed options.
- Click on the Replay button to start the replay at the chosen speed.

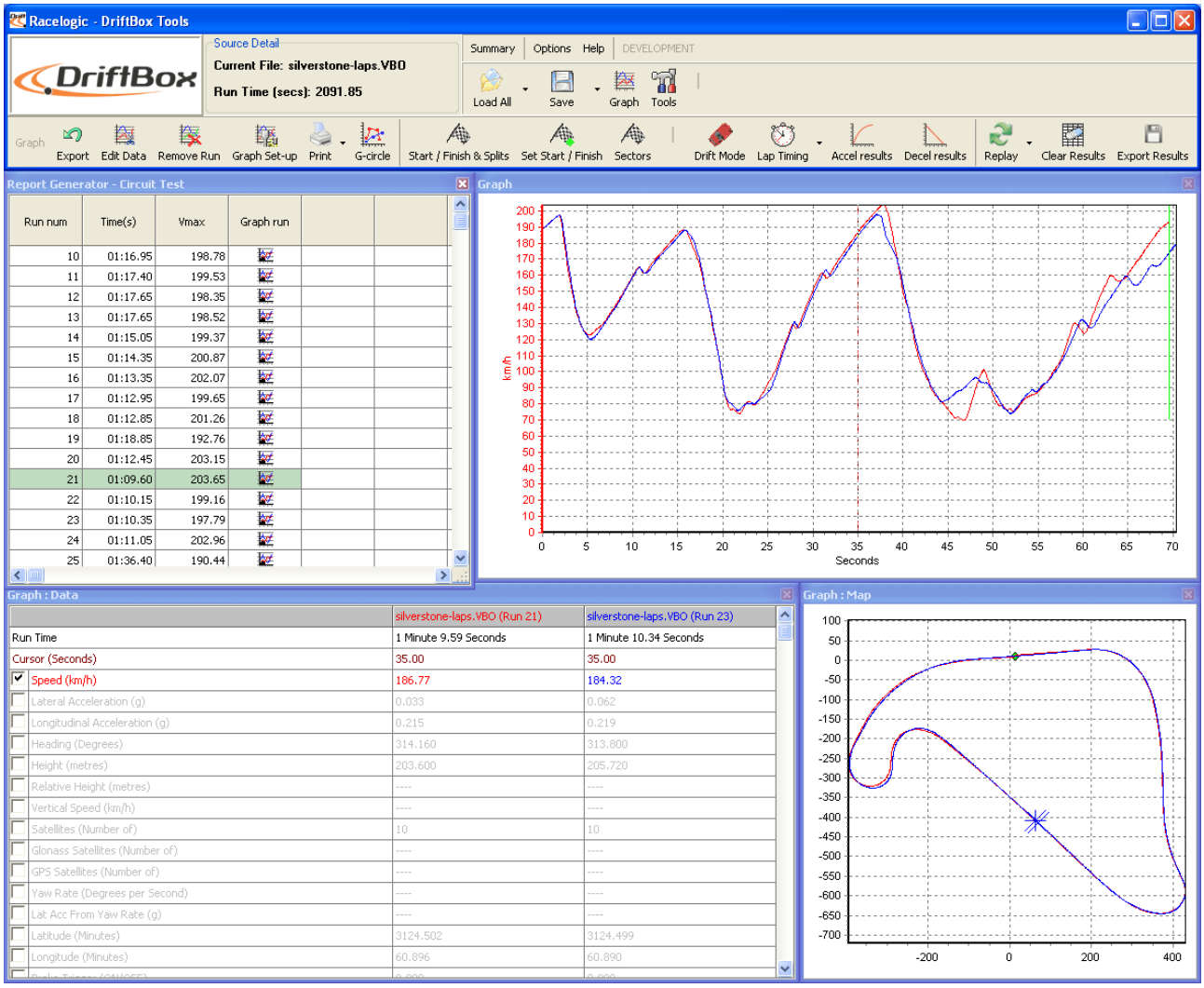
Replaying data with the drifting table active

When the Drift Mode facility is active and the replay facility is used, the Drift results table updates as the cursor passes through the sectors in the file.

Lap Timing

Pressing the Lap timing button in the Toolbar causes the software to scan the loaded file and apply loaded split file information to produce a table of Lap times, with a V Max for each lap and with the fastest lap highlighted.

This facility also allows individual laps from the loaded file to be loaded and compared in the main Graph window. In addition a circuit overlay can be loaded into the Graph:Map window to aid with drive-line analysis.



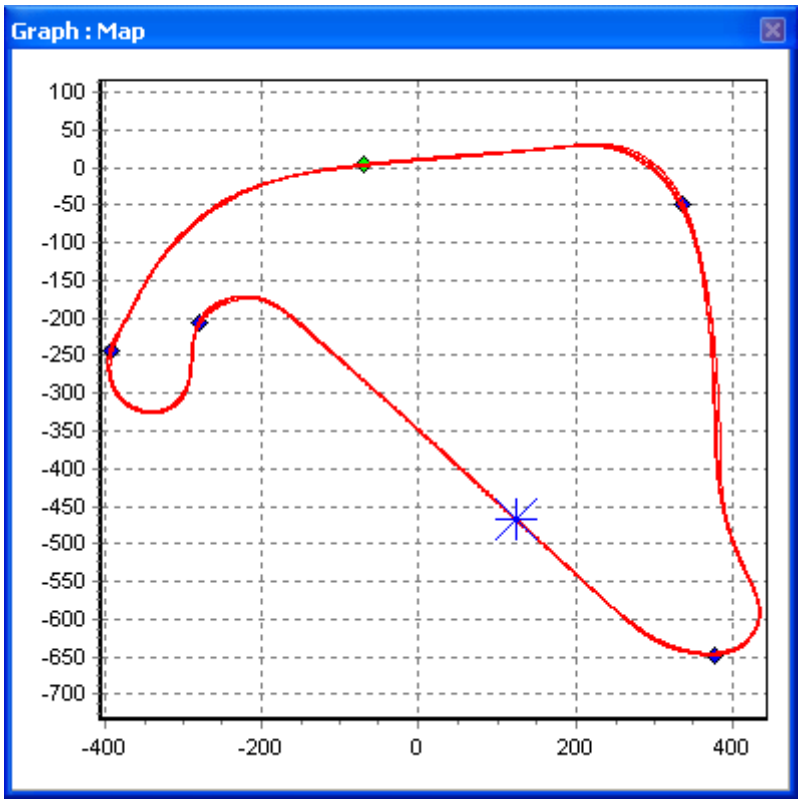
Start / Finish Lines and Splits

Before you can carry out any lap time analysis you must set a start / finish line in the file you have loaded. The information pertaining to these points can be saved to start / finish files for later use with new data from the same circuit, or for sharing with other DriftBox users.

Defining start / finish lines and splits in the DriftBox software

To define a start / finish line, move the cursor in the Graph window to the desired point, then press the SPACEBAR to mark a start / finish point, or press the Set Start / Finish button in the Toolbar.

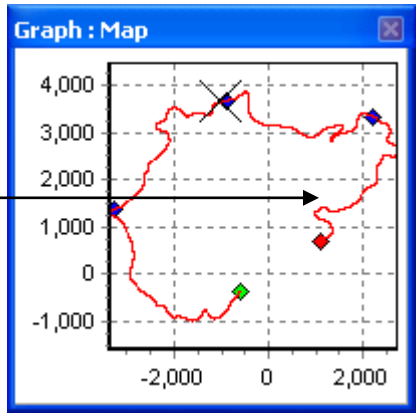
When the cursor is moved in the Graph window the cursor in the Map window follows this movement so you can see where the cursor point relates to on the track. After setting a start / finish line a green dot will then appear in the Map window at the corresponding cursor position.



In addition to the start / finish, up to 20 split points can also be set in the software. However if you save the start / finish and splits to a file for use in a DriftBox only the first six will be saved and used by the DriftBox. To ensure that only the maximum amount of splits that can be accepted by the DriftBox are created, an option to set this maximum is in the 'Start, Finish & Splits' menu.

To define the split points, press the '**S**' key at the desired cursor location or select the 'Set Split' option from the 'Start / Finish & Splits' drop down menu.

A separate finish line can be placed when the start line is not also the finish line. This is used in situations such as hill climbs, or for data analysis along a stretch of track that does not end where it starts - such as "Bridge to Gantry" at the Nordschleife in Germany.



Create a finish line by holding the SHIFT + SPACEBAR at the desired cursor location or by selecting the 'Set finish' button from the 'start / finish & splits' menu.
Note: It is important to try to place the start / finish line at a fast part of the circuit to reduce the effects of positional error and to get the best lap timing accuracy.

Loading and Saving start / finish line and split data

Click on the 'Save' option from the start/finish drop down menu to save to the start / finish and split line information created in the Graph screen to a '.dsf' file. If you want to save more than six splits for software use only then choose the file type '.spl' instead which is only compatible with the software and not DriftBox itself.

Click on the 'Load' button in the Start/finish drop down menu to load in a '.dsf' or '.spl' file.
If you have multiple .dsf files from various tracks, it is advisable to keep them stored on the PC in directories named after the track – then the DBOX.dsf file can be loaded into DriftBox prior to going to the circuit.

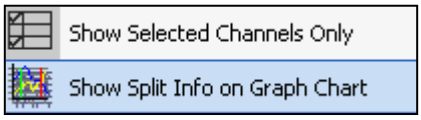
Clearing start / finish line and split data

If the current start / finish and split file information needs to be cleared from the DriftBoxTools background memory and display screens, select 'Clear All' from the 'Start / Finish & Splits' menu in the Graph screen toolbar, or from the main 'Tools' menu.

Moving Splits

Splits can be moved by pressing '**M**' in the Graph window and entering the number of the split to be moved, or by selecting 'Move split' from the menu.

Show Split Info on Graph Chart

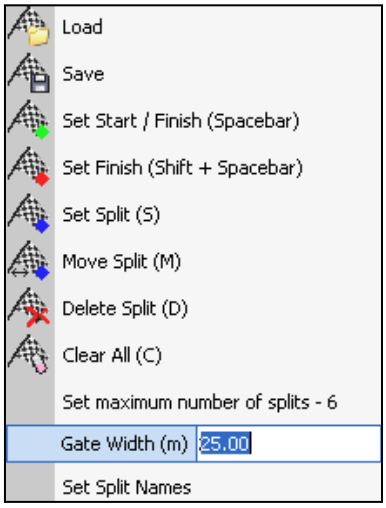


The start / finish and split lines can be hidden from view by selecting the Show Split Info on Graph Chart option. This is available either by right-clicking on any of the three main windows to bring up the context menu, or from the Graph Setup button on the Toolbar. If you choose to hide the start / finish and split lines they will still remain active – the software will still generate lap time data even if the lines are not visible.

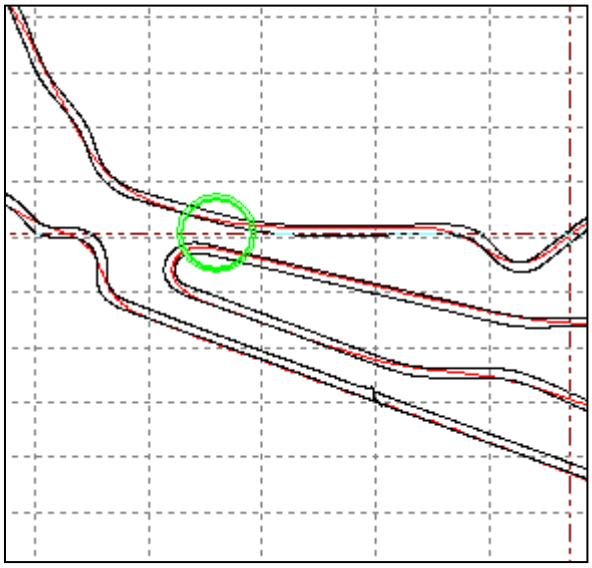
Gate Width

The width of the split gate can be set from the 'Start, Finish & Splits' menu.

If you intend to create a .dsf file in DriftBox Tools for use at a circuit, where split points are placed on areas of track which pass very close to each other, it may be necessary to reduce the gate width accordingly: this will ensure that you do not inadvertently drive back through a split point even though you are on a different section of the track. See the example on the next page.



Software



The circled area circled in green shows two sections of track passing by each other by only approximately 20m. If a split point is set on this section, and the virtual gate has been set too wide, the split point could be registered by the DriftBox as it passes by in the opposite direction.

Track proximity can be checked in Google Earth™ using the measurement tool if you are in doubt as to how wide the split points should be created.

Split Names

Split points can be named from the option in the 'Start, Finish & Splits' menu. When the Lap Timing – Split Line option is chosen to display lap times (assuming that split points have been created) an extra column will display the split names.

Displaying Lap Times

Load the DriftBox .dbn file into the software, then define a start / finish line (along with split points and a separate finish line if required) in the manner described above, or by loading a .dsf or .spl file.

Report Generator - Circuit Test

Run num	Time(s)	Vmax	Graph run
1	01:27.80	120.69	
2	01:27.90	120.48	
3	01:27.60	116.84	
4	01:28.30	115.97	
5	01:30.70	125.07	
6	01:27.30	115.92	
7	01:26.40	117.13	
8	01:26.10	121.51	
9	01:26.30	120.73	
10	01:34.80	117.82	

Press the Lap Timing button on the Toolbar. The software scans the currently loaded file, extracts lap times and Vmax for each logged lap, and displays the data in a results window.

Note: The fastest lap in the results table will be highlighted for quick and easy recognition (see example left.)

Including Split times

If you have set up split points in addition to the start / finish and wish to see the split times displayed, click on the right hand arrow on the Lap timing button, then from the drop down menu select 'Lap Timing – Split Line'. The results table will show the split times as well as the Lap times in the file.

Naming the split files (see 'Split Names' above) from the option in the 'Start, Finish & Splits' menu will result in the split names being displayed when the 'Lap Timing – Split Line' option is chosen – see the example on the next page, which shows the split points that have been set on corners at Silverstone Circuit and named accordingly.

Exporting Lap Time Results

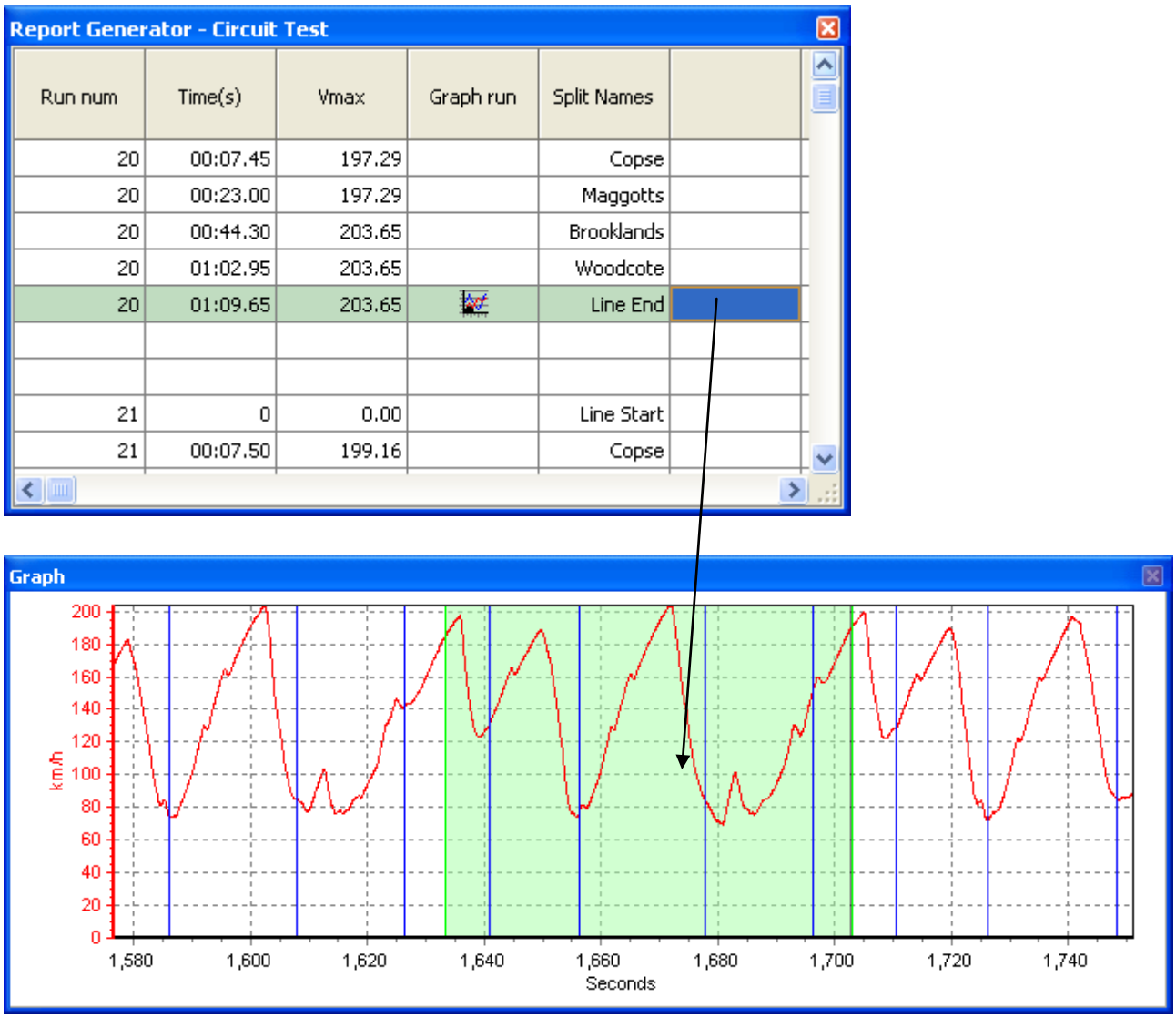
The generated results can be exported into other software as a variety of document types by clicking the Export Results button on the Toolbar and selecting the required file type.

Clearing Lap Time Results

To clear all the results in the results window, click the 'Clear Results' button on the Toolbar.

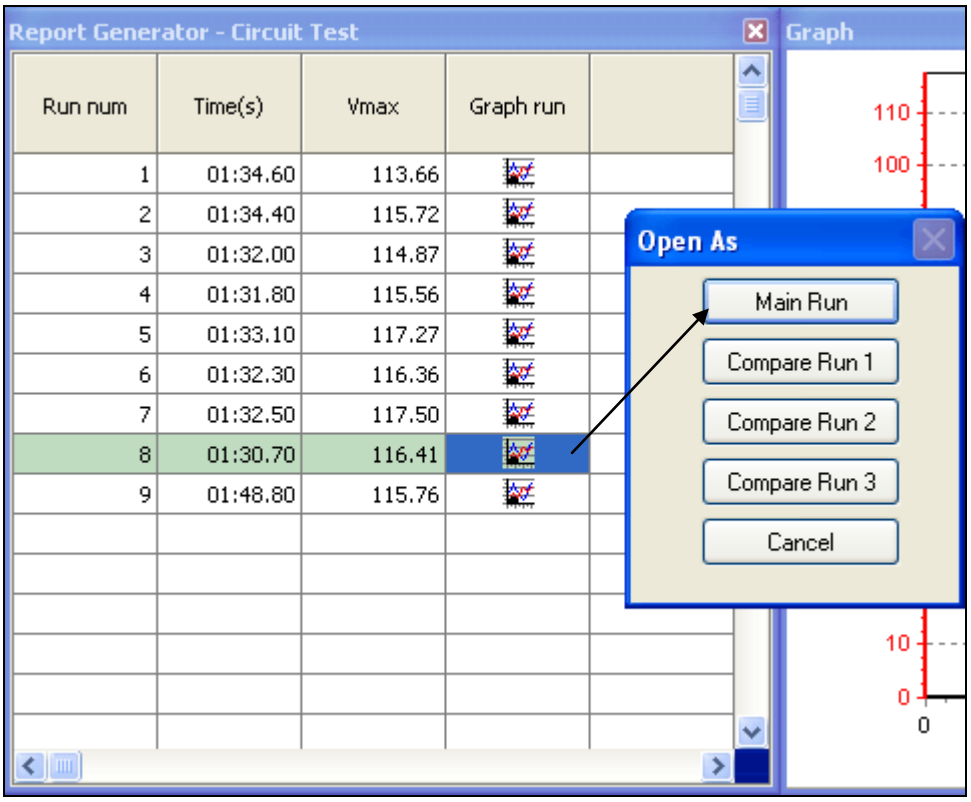
Lap Highlight

With lap data being displayed in the 'Report Generator – Circuit Test' window, individual laps are highlighted in the main Graph screen by clicking on any of the values at the bottom of individual lap/split data tables:

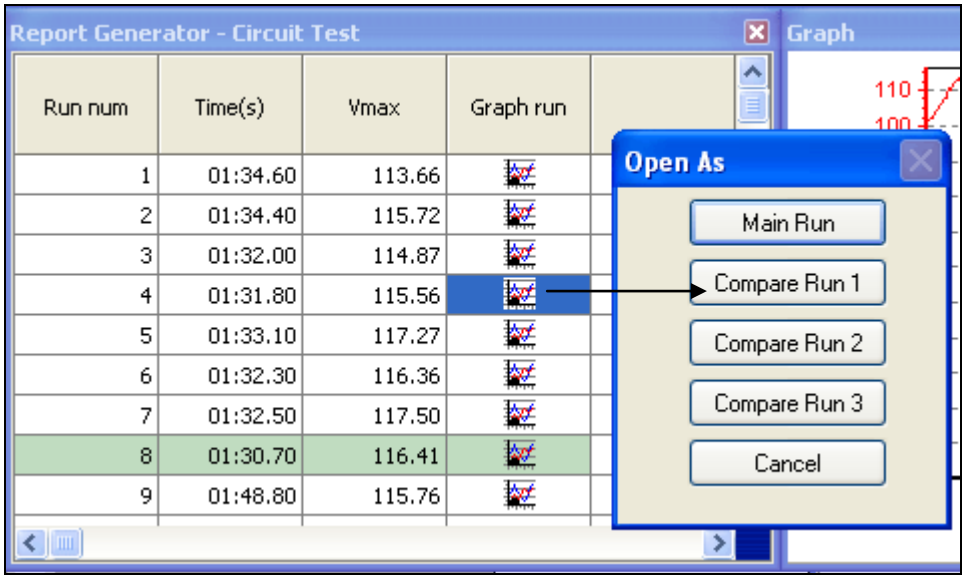


Loading and comparing individual laps from the same file

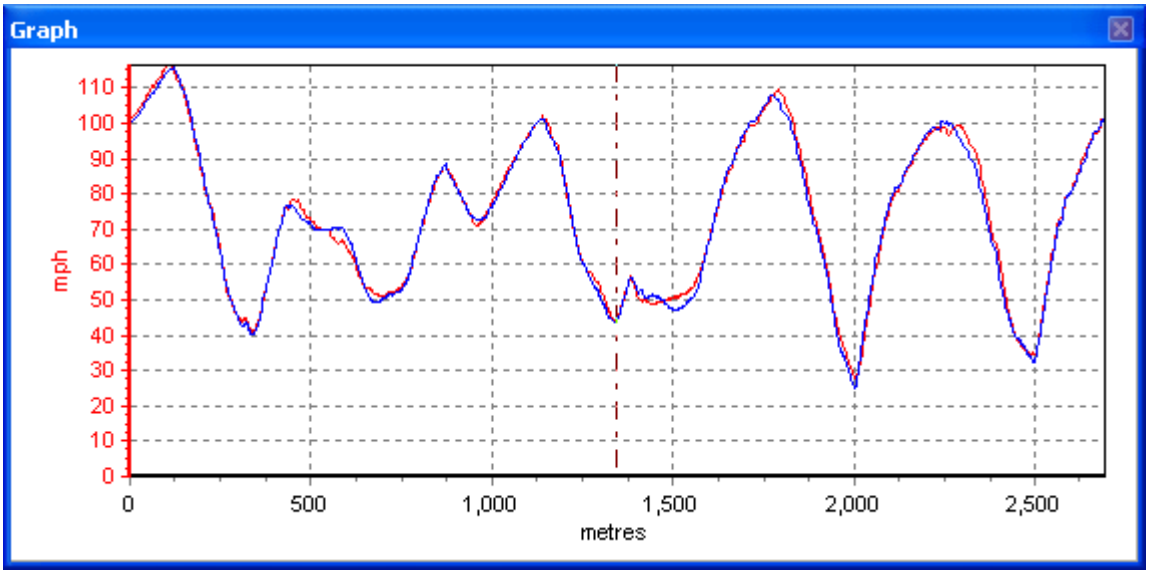
Individual laps from the loaded file can be compared to each other in the main Graph and Graph:Map windows. Each lap shown in the Lap timing table has a Graph Icon associated with it in the right hand column. Clicking one of these buttons allows that lap to be individually graphed:



You will now have one individual lap displayed in the Graph window, and one corresponding column in the Graph:Data window. From the results window, select a compare lap by clicking a different Graph Icon, in this example the next fastest lap:



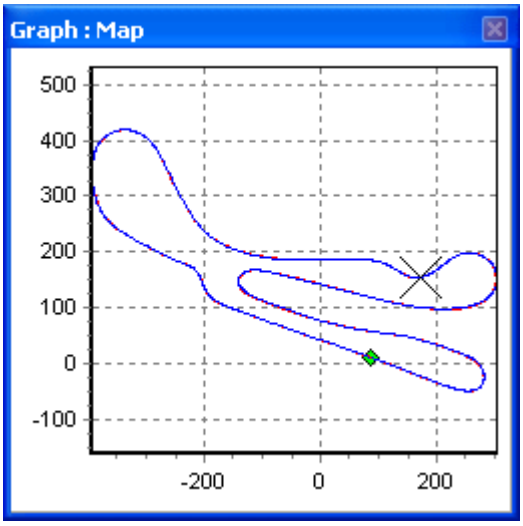
Result in the Graph window:



The main run is in red, the compare run in blue. In this instance the two laps have been performed very consistently: the peaks and troughs, which indicate the braking and acceleration points, sit on top of each other almost every time.

Note that the Graph window's X axis is set to distance – this makes direct comparison of braking and acceleration points possible as the distance covered on each lap will be virtually identical. If comparison laps are loaded when the Graph window's X axis is set to time, the data is very much more difficult to analyse.

Result in the Graph:Map window:



Note how in this instance, the driver's lines have barely deviated between the two laps – the main run in red is only just visible below the compare run in blue.

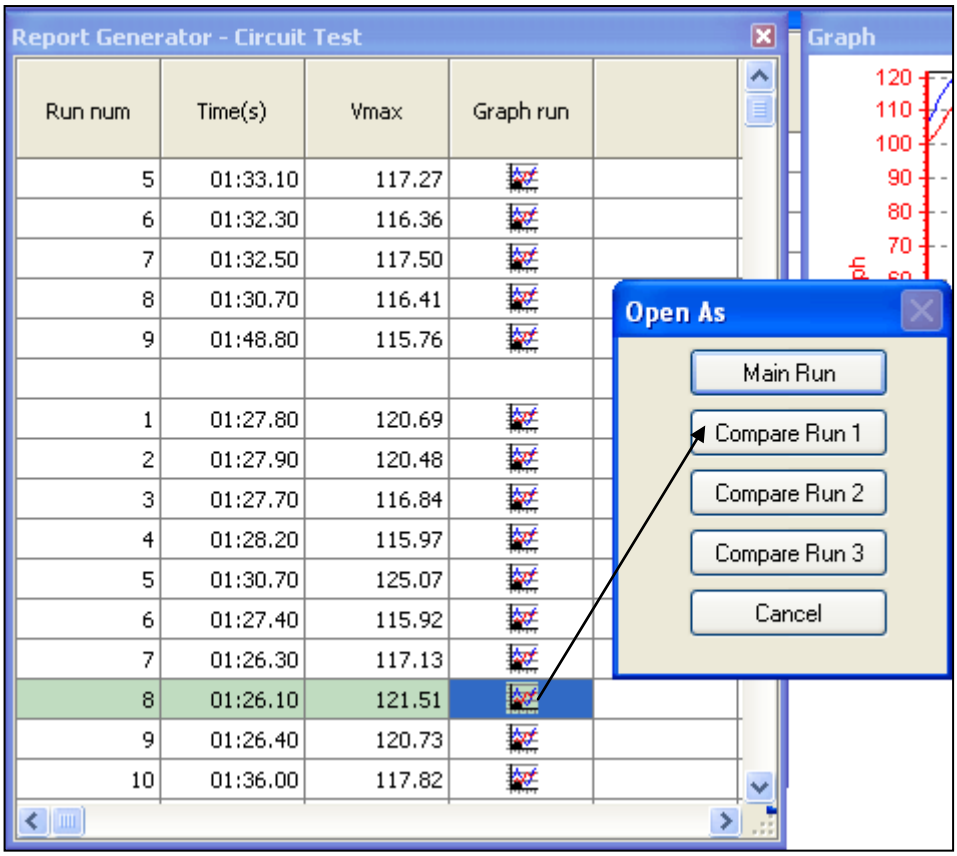
Three compare laps can be loaded in total, allowing for comparison of four laps at once (the main run plus compare runs 1, 2, and 3.) Each compare lap will have corresponding data displayed in an individual column in the Graph:Data window. To change the colours of each run, open the Channel Setup window and pick the colours required from the Run *x* columns.

Loading and comparing individual laps from different files

Lap data created by individual users, and therefore not logged in one .dbn file, can also be loaded and compared:

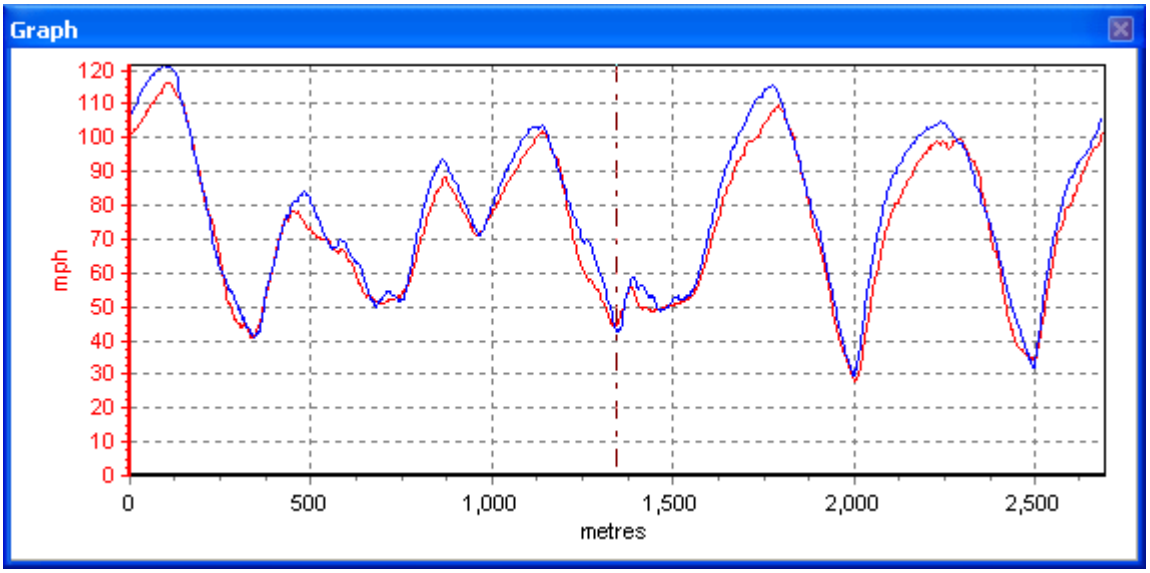
- Load the first file containing the lap data, set the start / finish line, and click the lap timing button. The laps will appear in the results window.

- Load the next file to be analysed – ensure that the results from the first file have not been cleared, and do not load the second file as a compare file.
- Click the laptiming button again and the second set of lap times will appear in the results window.
- The individual laps can now be chosen as Main and Compare files in the same manner as before:



In this example, the main run chosen is lap 8 from the first set of times (the same fastest lap from the previous example.) The Compare Run 1 is lap 8 from another file, which is again the fastest lap. See below to view the differences in performance as shown in the Graph window.

Result in the Graph window:



The main run (1:30.70 – the fastest lap from the previous example) is in red, the compare run (1:26.10) in blue. Note in this instance how there are differences in the peaks and troughs of the

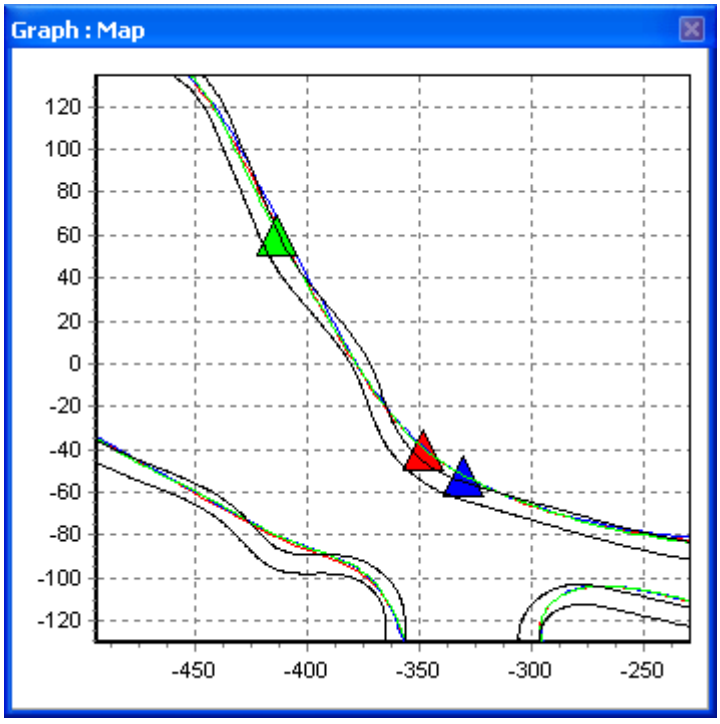
speed plots, indicating that the faster driver carried more speed before braking, and accelerated harder.

Replaying Laps

If you have recorded laps loaded into the software you can replay them, by clicking on the Replay button. By default the cursor will move through the Graph window and round the path in the Graph:Map window at the same speed at which the file was recorded. However by clicking on the arrow to the right of the button a faster replay speed can be chosen.

When the Replay button is pressed the Drift Meter and Sector windows will also appear, but these can be closed if not required.

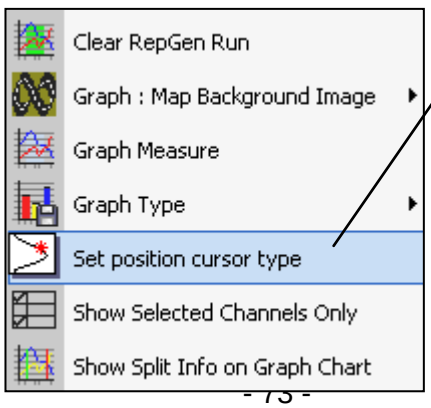
Whilst the file is being replayed the cursor in the Graph:Map will move around the path taken. If more than one lap is currently being viewed there will be a cursor for each run, and these will move around the circuit in a manner according to how the graph window x axis has been set: if the Graph window is displaying speed over distance, the cursors will move around the circuit together, as the distance covered during each lap will be virtually identical. However, if the Graph window is set to speed over time then the cursors will travel according to the actual lap times.

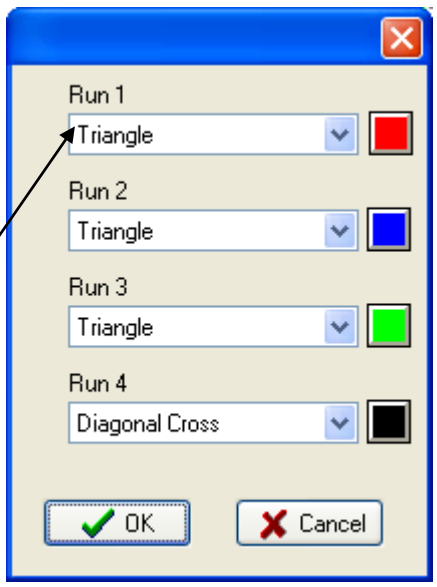


Note in this example (left) how the green triangle is behind the red and blue triangles – this is a snapshot of three individual laps being replayed when the Graph screen has been set to speed over time. This feature allows for 'live' analysis of where a driver is gaining or losing time, and on which part of the circuit.

Set Position Cursor Type

The cursors themselves are configurable: right click on any of the main windows (Graph, Data or Map) to bring up the context menu (or click on the Graph Setup button on the Toolbar.) Select 'Set Position Cursor Type' and choose the style and colour required for each cursor. Each run can now display a different shape and colour of position cursor:





Circuit Overlays

A circuit overlay is a file created to map the outer and inner bounds of a circuit, and is a useful aid in drive-line analysis - comparison of lines taken by different drivers can help to improve lap times.

NOTE: A circuit overlay is only a feature that can be used in software post-processing – it is not vital that it is created or obtained prior to visiting a circuit unless specific drive line analysis, including the track boundaries, is going to be carried out between lap sessions.

Creating a Circuit Overlay

There are two ways that an overlay file can be created: either by driving around the circuit, or by creating a .kml file in Google Earth and importing it into DriftBox Tools.

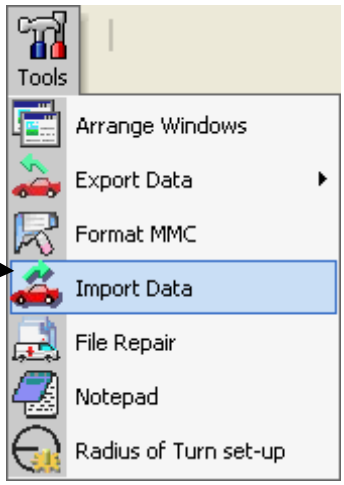
Creating an Overlay File by Driving the Circuit

Note: It is best to use an external antenna to get maximum positional accuracy

- Power up DriftBox and let it acquire satellites for at least 5 minutes.
- Drive to the left hand side of the start of the circuit.
- Place the antenna on the left hand side of the roof.
- Insert the SD card, ready for logging.
- Drive round the left hand side of the circuit.
- Stop back at the place you started.
- Move the antenna from the left hand side of the roof to the right hand side slowly, being careful not to cover the aerial – let it see the sky at all times.
- Drive at right angles across the track to the opposite side.
- Drive round the right hand side of the circuit.
- Load the logged file from the SD card using ‘File’ -> ‘Load All’
- Save using ‘Save’, select ‘Save as type’ and pick ‘Circuit file’ (‘.cir’).

Creating an Overlay File in Google Earth™

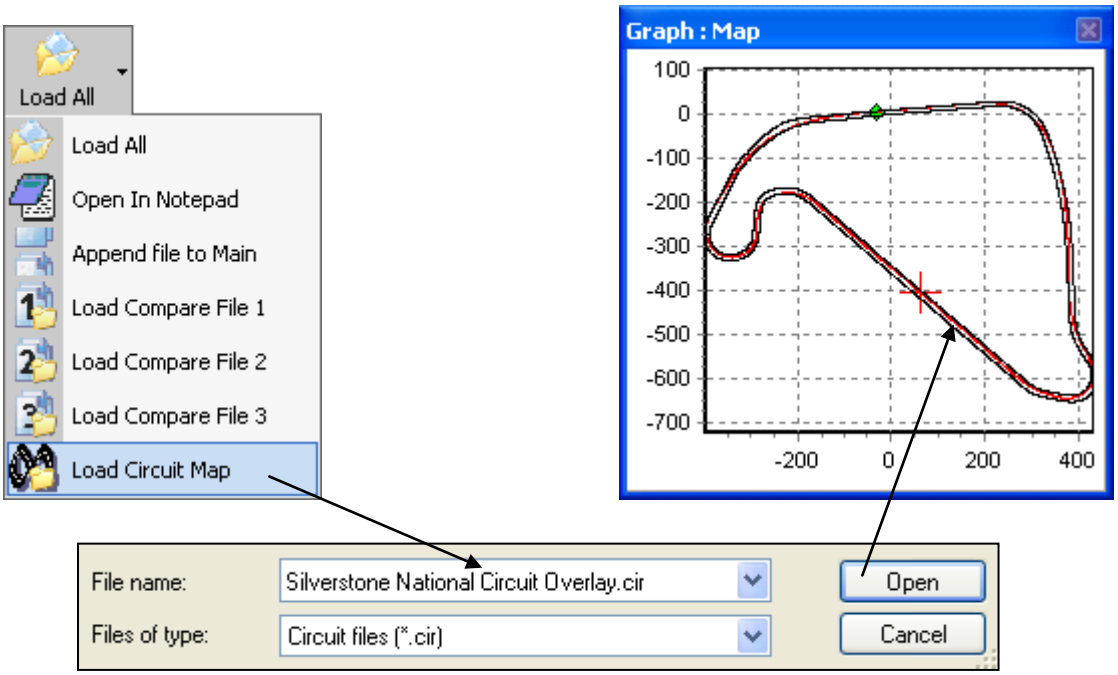
Please refer to the Google Earth help files for instructions on creating paths in the software. Once you have plotted a path along the inside and outside of your chosen track, it must be saved as a .kml file. This can then be imported into DriftBox Tools by clicking on **TOOLS>Import Data**



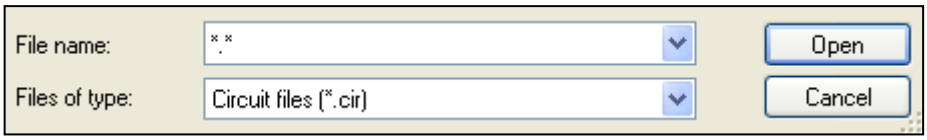
Once the .kml file has been imported, it can be re-saved as a .cir file for later use with lap data from the circuit. See page 76 for more information about importing .kml files.

Loading a Circuit Overlay File

The .cir file can be now be loaded into the Graph screen and viewed in the Map window. To do this, first load a file logged from the circuit in question, and then click on the drop-down arrow next to the Load All button. Select Load Circuit Map, and choose the .cir file you have created:



If you want to load a .cir file into DriftBox Tools on its own, click Load All and then type *.* in the File name field:



You can then select the .cir file and it will load like a normal .dbn file.

A library of circuit overlay files is available from the DriftBox website. If you would like to share circuit files you have created please contact us and they will be added to those already available.

Aligning Circuit Overlays and Laps

The standard positional accuracy of DriftBox is 5m 95% CEP for Longitude and Latitude.
CEP = circle error probable.

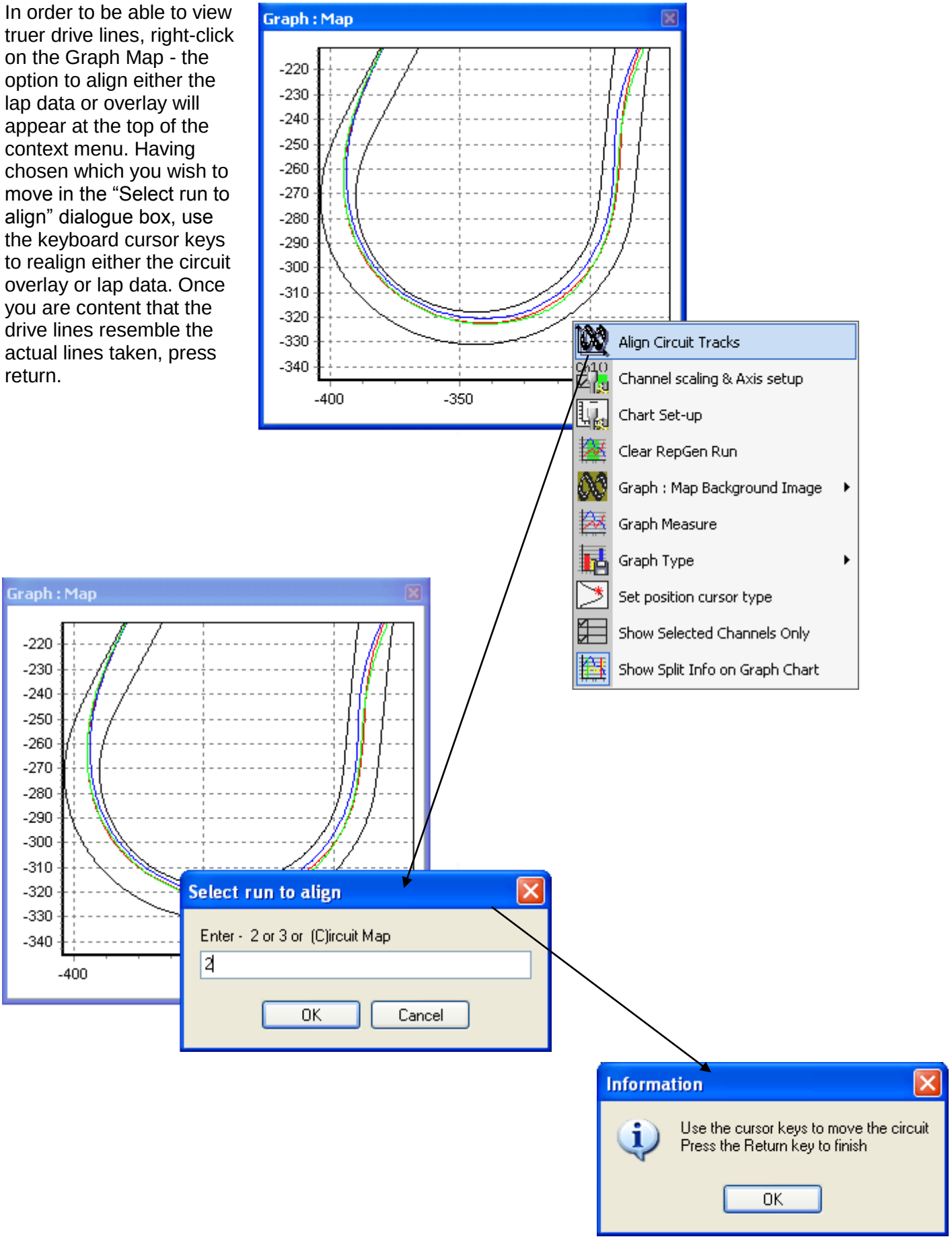
95% CEP means 95% of the time the position readings will be within a 5m diameter circle of the true position. This error is due to the changing state of the ionosphere, constantly changing the time taken for the satellite signals to reach the earth. This means that overlaid laps may appear to miss the edges of the track, especially if the laps or overlay were logged several hours apart.

The Align Circuit Tracks feature allows post-processing analysis to counter some of this positional error, by rearranging the driving lines or circuit overlay in the Graph:Map window. This can be especially useful if the circuit overlay file has been created in Google Earth, which is not always 100% positionally accurate (a good example of this, at the time of going to press, is the Paul Ricard circuit in the south of France – the Google Earth image is approximately 200m adrift of its true position.)

This feature can also help to combat the effects of positional shift that have occurred between sessions at a circuit, such as morning/afternoon or one day to another.

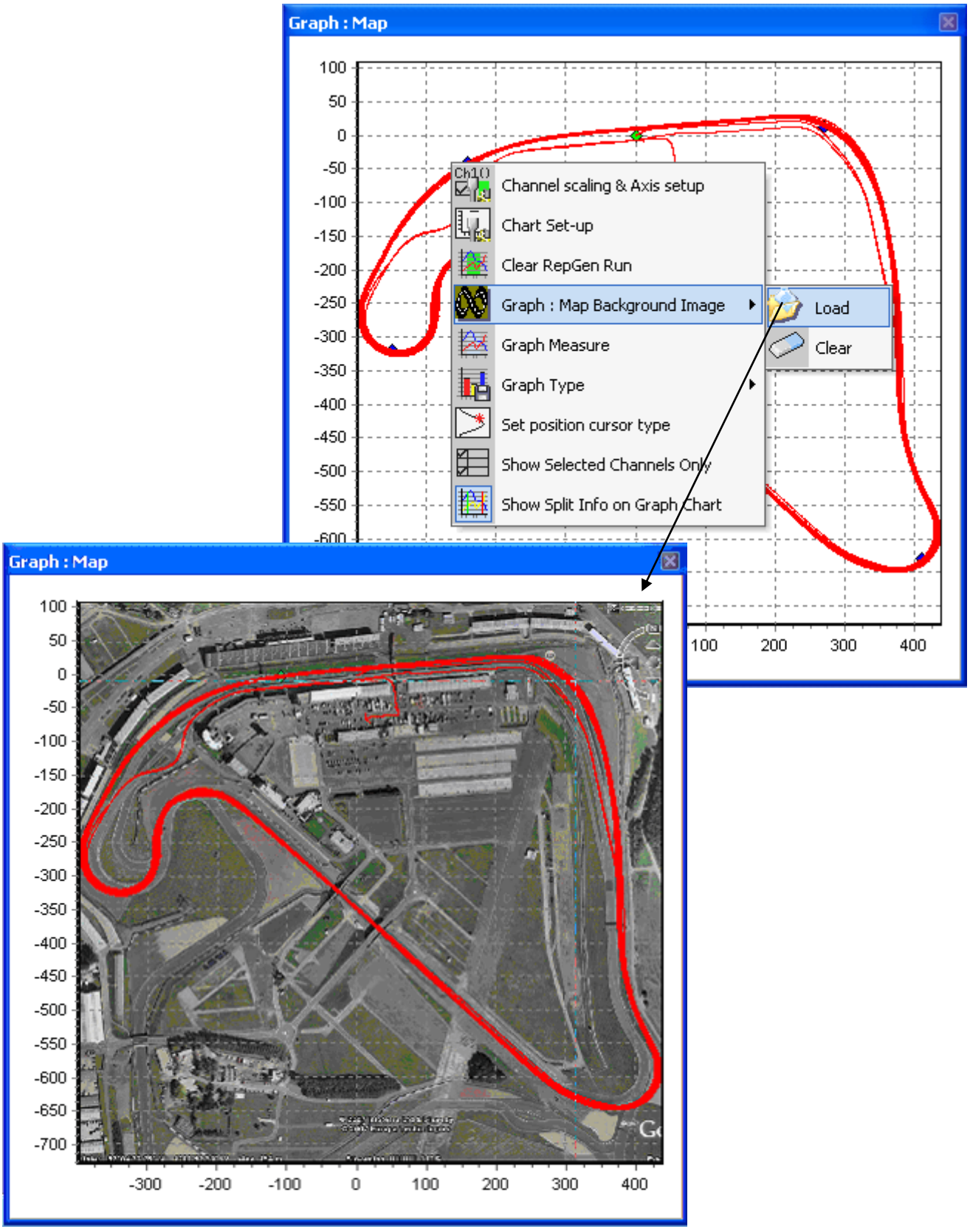
Software

In order to be able to view truer drive lines, right-click on the Graph Map - the option to align either the lap data or overlay will appear at the top of the context menu. Having chosen which you wish to move in the “Select run to align” dialogue box, use the keyboard cursor keys to realign either the circuit overlay or lap data. Once you are content that the drive lines resemble the actual lines taken, press return.



Importing a background image in to the Graph Map

You can import any image of your choosing into the Graph Map by right-clicking on either the Graph:Data, Graph:Map, or Graph windows and selecting the Graph: Map Background Image>Load option:



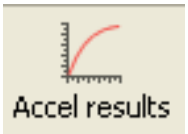
Performance Results

Acceleration and deceleration results can be easily extracted from your logged data by using the various performance results tools. These are available by clicking on the 'Accel results' and 'Decel results' buttons on the Toolbar.

You can extract speed or distance data for acceleration and deceleration runs. Most of the tests use standard parameters (such as 0-60 or 0-100) but custom results can also be produced.

Producing Acceleration Results

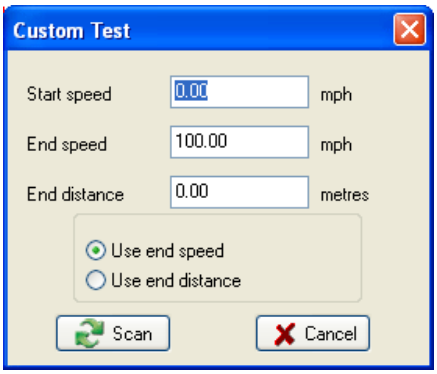
Acceleration data can be produced and shown in a results table from the currently loaded data file by selecting one of the acceleration test options within the 'Accel results' drop down menu. Click on the 'Accel results' button to open a list of the following options:



- **0-VMax:** This will tabulate speed, time and distance data, starting each time the velocity data has a value of zero up to the maximum speed reached during that acceleration period.
- **0-100 kmh (0-60 mph):** This will tabulate speed, time and distance data, starting each time the velocity data goes from zero up to a speed of 100 km/h reached during that acceleration period.
- **0-160 kmh (0-100 mph):** This will tabulate speed, time and distance data each time the velocity data goes from zero up to a speed of 160 km/h reached during that acceleration period.
- **0-160-0 kmh (0-100-0 mph):** This will tabulate speed, time and distance data, starting each time the velocity data goes from zero up to a speed of 160 km/h then returning to 0 km/h reached during that acceleration - deceleration period.
- **100-200 kmh (60-130 mph):** This will tabulate speed, time and distance data, starting each time the velocity data goes from 100 kmh up to a speed of 200 km/h reached during that acceleration period.
- **Qtr mile:** This will tabulate speed, time and distance data, starting from zero to a total distance of a quarter mile (402.25m.)
- **60ft:** This will tabulate speed, time and distance data, starting from zero to a total distance of 60 feet (18.7 m.)
- **30 ft:** This will tabulate speed, time and distance data, starting from zero to a total distance of 30 feet (100 m when the units of measurement for distance are metric.)
- **Custom:** This will tabulate speed, time and distance data, starting over a custom defined speed range e.g. 0-100-0 kmh.

For each of the test ranges the results table will show Speed, Time, and Distance in 10Kph or 10Mph steps.

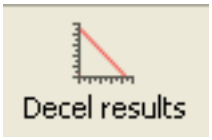
Creating a Custom Acceleration test



1. Click on the Custom option in the Accel test drop down list. This will then open the following window:
2. Enter the speed of the start condition.
3. Set the end condition option, speed or distance.
4. Enter a value for the chosen End condition.
5. Press Scan to scan the loaded file and produce a table of results for all tests fitting the custom test setup.

Producing Deceleration Results

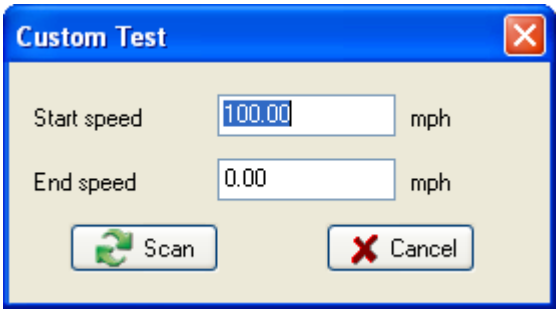
Deceleration data can be produced and shown in a results table from the currently loaded data file by selecting one of the deceleration test options within the 'Decel results' drop down menu. Click on the 'Decel results' button to open a list of the following options:



- **70-0 kmh:** This will output the time and distance taken to decelerate from an initial speed of 70 kmh to 0 kmh.
- **50-0 kmh:** This will output the time and distance taken to decelerate from an initial speed of 50 kmh to 0 kmh.
- **Custom:** This will output the time and distance taken to decelerate from one user definable initial speed to another, e.g. 100 kmh – 0 kmh.

In all of the Decel tests if more than one run is performed an average distance is also calculated and shown.
Any of the Runs on the table can be omitted from the average by deselecting the tick in the use box.

Creating a Custom Deceleration test



1. Click on the Custom option in the Decel test drop down list. This will then open the following window:
2. Enter the speed of the start condition
3. Set the speed of the end condition.
4. Press Scan to scan the loaded file and produce a table of results for all tests fitting the custom test setup.

Additional Data Analysis Features

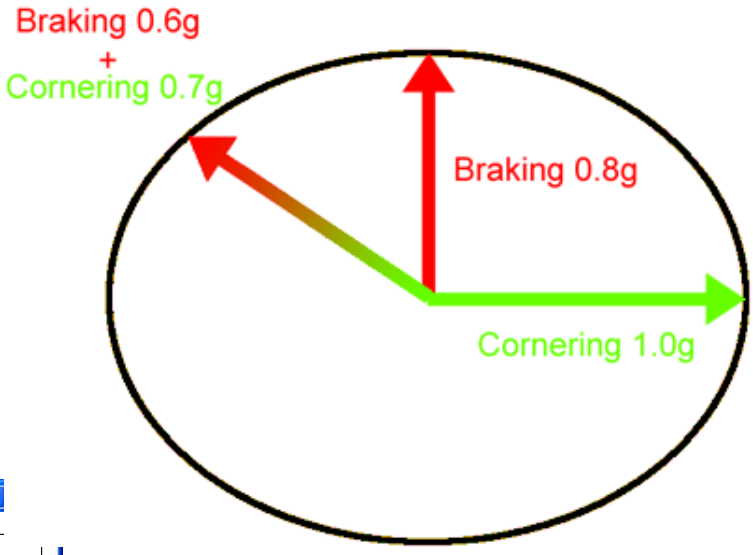
The software has additional features to aid in data analysis, explained in this section. Many of these features can be used as a part of the analysis whilst producing either Drift, Lap or Performance results.

The G-Circle

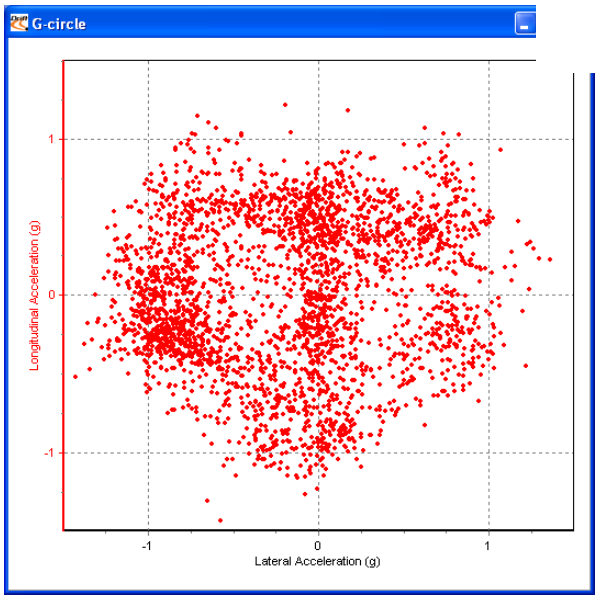
Pressing the G-Circle button produces a plot of the Longitudinal vs Latitudinal Acceleration data.

A G-circle (or G-G Plot as it is sometimes known) gives a complete overview of how the tyres are being used. There is a limit to how much G a tyre can generate whilst cornering, and a set amount it can generate whilst braking/accelerating. There is often a small difference between these two values, so you may be able to pull more G in braking than in cornering or vice versa.

However, if you try and combine corning whilst braking, then these limits are reduced. The idea behind a G-circle is that it tells you how these can be combined. To the right is a theoretical perfect G-circle for a sample tyre.



You can see that the maximum cornering force is 1g, and max braking is 0.8g. However, if you are already braking at 0.6g, then your max cornering force is only 0.7g.



Plotting out your own G-circle lets you know if you are exploiting your tyres' true potential.

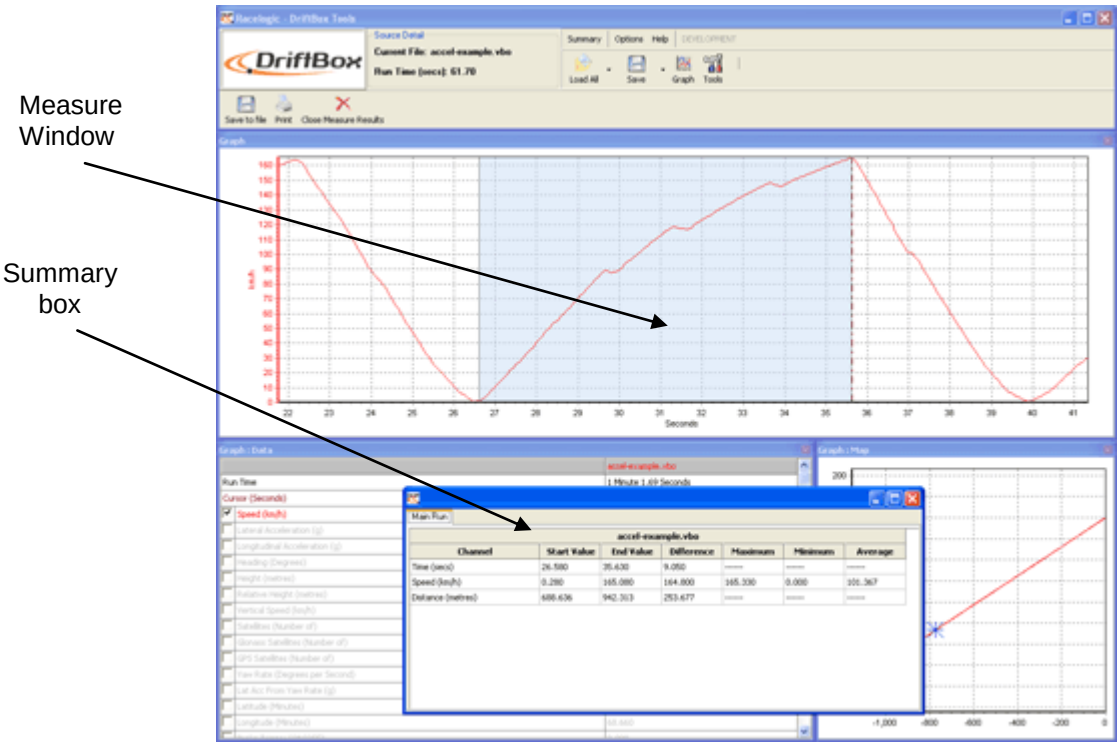
Ideally you should get a symmetrical plot, but bear in mind that you can almost always generate more G under braking than acceleration, so the accelerating area will be shallower than the braking part of the circle.

The example on the left shows a very good spread of data indicating that the rider (motorcycle) was able to accelerate and decelerate whilst cornering to a very good level, creating a symmetrical plot.

The G-Circle can be examined more closely by zooming in as you do with the Graph:Map, and by right-click-dragging the current field of view can be moved.

Graph Measure Tool

This tool can be used to highlight a section of data in the Graph window and produce a table that summarises the data captured in the window:



Hold shift down whilst clicking and dragging to use the Measure Tool

The area of data that is displayed in the table is highlighted in blue in the Graph window. This is often useful for quickly establishing average values between two points in a file. In the screen shot example above the first gear section of the acceleration curve has been highlighted and it can it can be seen from the table that an average Longitudinal Acceleration during first gear is easily seen.

Creating a Measure Tool Window

To highlight a section in the graph window, move the cursor to the start of the section you wish to highlight. Then place the mouse pointer over the cursor position and press and hold the '**Shift'** key, then click and hold the left mouse button. Keep the left mouse button pressed and move the mouse cursor right to drag out a blue highlighted area. At the end of the area you wish to highlight, release the left mouse button. On release of the left mouse button a table of results for all channels in the highlighted area appears as in the screenshot above.

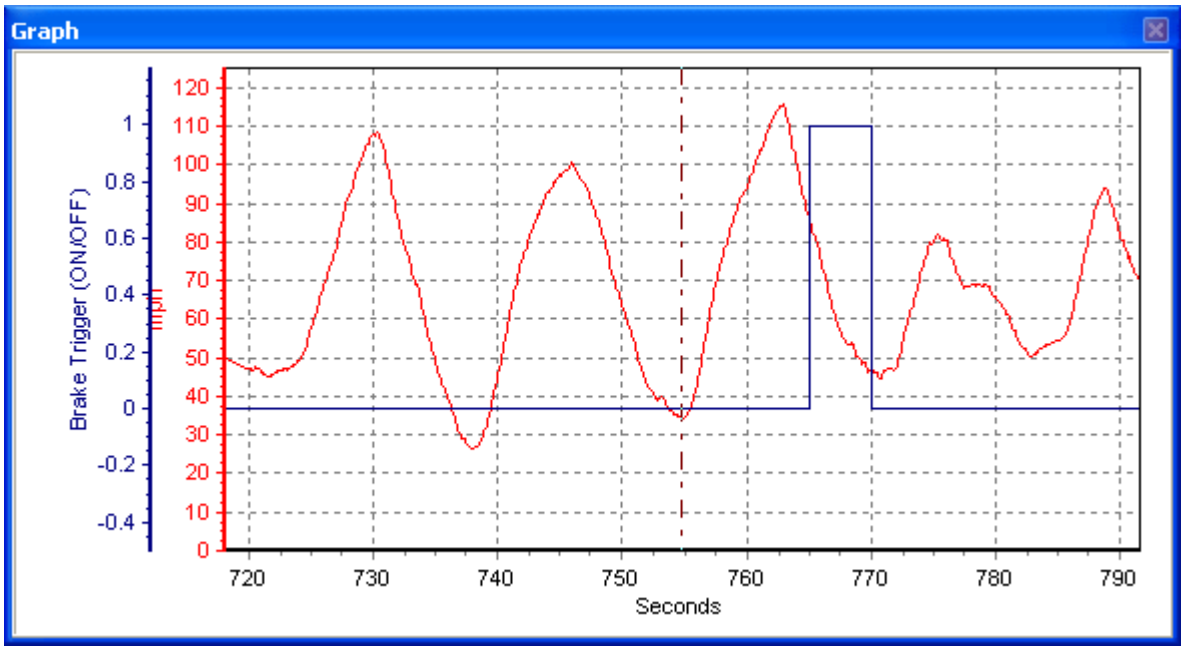
Saving and Printing the Measure Tool Data Table

Click the 'Save to file' icon in the Measure Tool toolbar to save the data in the table in one of two formats, .csv or '.txt'. Click the 'Print' icon in the Measure Tool toolbar to print the table.

Event Marking

Event Marking allows for the Brake Trigger channel to display a change in state – an 'event' in a logged file which can be useful for measuring distances etc.

The Brake Trigger channel defaults to a value of 0, until the an event is marked (see pages 22 or 31) at which point the value will become 1. The Brake Trigger channel should be set up in the software so that this can be easily observed, by assigning its axis in a manner such as this:

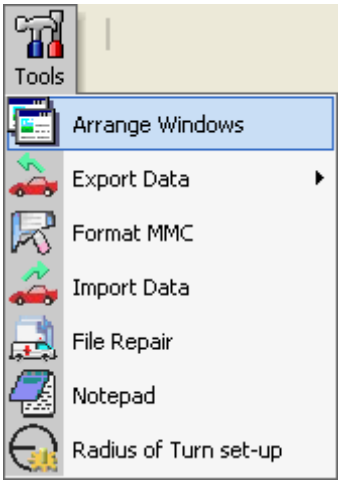


Note how in the example above, the axis has been set from –0.5 to 1.2 – this allows for the change in values from 0 to 1 to be very obvious on the graph. If you do not want the constant value of 0 to be displayed, set the lower axis level to 0 – the event mark will then be displayed as a 'spike' in the graph.

The example above demonstrates an event created by the user holding the OK button on the DriftBox for five seconds: the event will continue to be recorded for as long as the button is pressed.

Tools

Clicking on the ‘Tools’ icon on the Toolbar will reveal a drop-down list containing a number of useful features, such as File Repair and the Exporting Data to Mapping Software facility.



Arrange Windows

The use of different screen resolutions or multiple screens can cause DriftBox Tools windows to be placed out side of the default screen size, which is then not viewable when the default screen is used.

This facility allows any DriftBox Tools windows that have been lost off the visible screen to be located back into the visible screen area.

Export Data

This option allows the location data stored on a ‘.dbn’ file to be converted into a ‘.txt’ file that may be used with Google Earth, Microsoft AutoRoute and Microsoft Streets & Trips, to show the vehicle’s path in the mapping software. This option is also used to create a file that can be used in Track Vision software.

Exporting Data to Google Earth™

Data can be exported to Google Earth by selecting the Tools menu and choosing the Google Earth option. The resultant file .kml is recognised by the Google Earth software and allows data to be viewed on the satellite images.

Upon exporting the file, you will be prompted for an X and Y offset: this allows for data to be correctly aligned on the satellite images – much of Google Earth is not exactly accurate so some exported files, such as circuit overlays, may ‘miss’ the edges of the track. The offset allows for this error to be corrected.

NOTE: if your data file has more than 65,000 sample points the DriftBox software will automatically sub-sample the file to ensure the entire length of the file is represented in the exported file. Google Earth cannot display files of greater than 65,000 samples.

Exporting to Mapping Software (AutoRoute or Streets & Trips)

Load the ‘.dbn’ file into DriftBox Tools using the ‘Load All’ button from the main toolbar, then click on the ‘Export Data To Mapping Software’ option in the ‘Tools’ menu.

A small selection box will appear, in which the export rate can be chosen.

Importing the Mapping file into AutoRoute or Streets & Trips

Open AutoRoute or Street & Trips. Click on ‘Data’ and then select ‘Import Data Wizard’. When prompted, browse for the ‘.txt’ file you have just created with DriftBox Tools and

open it, then select ‘Comma’ as the delimiter and click ‘Next’. In column F2 select Latitude as the column name from the drop down menu. In column F3 select Longitude as the column name from the drop down menu and then click ‘Finish’. The program then generates a map of your data location and places markers on the map at every data point that was specified when the output file was, for example once every second.

Exporting To Track Vision

This option creates a csv file with the data in a format that Track Vision software can use.

Formatting MMC/SD Cards

Any new MMC/SD cards are formatted in the correct format suitable for DriftBox and there is no need to format the card. You can delete any files created on the card by DriftBox through your computer when connected to DriftBox or when the card is inserted in a card reader connected to your computer.

However if your card has a problem and the card needs to be formatted it is best to do this through the DriftBox Tools software SD card formatting facility.

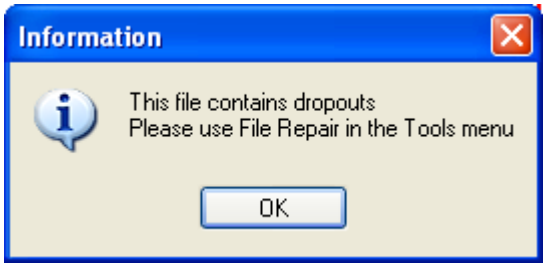
Note: that the card will need to be inserted into a suitable card reader in order to format it; it cannot be formatted through the DriftBox and USB cable.

Import Data

Data created in Google Earth™ as a .kml file can be imported into DriftBox Tools. This is particularly useful for creating circuit overlays without having to physically drive the track (see ‘Creating a Circuit Overlay’ on page 67.) Only .kml files can be imported, so when saving paths created in Google Earth it is necessary to ensure the correct file type is chosen (the other option is .kmz, and is not a valid import file type for DriftBox Tools.)

File Repair

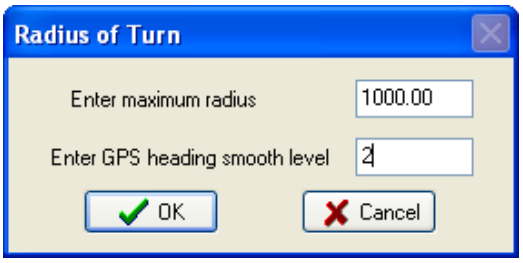
If the file being loaded into the software contains dropped sample data (caused by travelling under a bridge, for example) then Performance Tools will prompt you to repair the file. This can be done by clicking on the Tools menu and choosing File Repair. Areas of dropped samples will be then repaired.



Once the repair has been carried out is advisable to save the file and reload it. This will ensure that all channels are correctly aligned in the Graph screen. Areas that have been repaired will be represented in the Number of Satellites channel as 0.

A repaired file may still display the Dropouts message upon being reloaded. This is generally due to the dropouts occurring at a time when the number of available satellites is so low that an effective repair cannot be carried out (such as travelling through a tunnel.)

Radius of Turn set-up



Click this option to open the Radius of Turn setup window, in which the smoothing level and maximum radius value can be set.

When smoothing is applied to data, the value of an individual sample point is affected by samples around it. As the effective Radius of a straight line is infinite, the very high samples of data before and after a corner can adversely affect the values of Radius in a corner. To reduce this effect it is advised to set a maximum radius value to a fraction higher than the maximum radius of the corners you are examining.

Other Features

Some useful features that apply to the whole of the DriftBoxTools software have been included above the main toolbar. These are described in the following section.

Export Results

All Performance or Lap Time results can be exported by clicking on the Export Results button on the Toolbar. Results can be exported in a variety of formats such as Excel or Word document files.

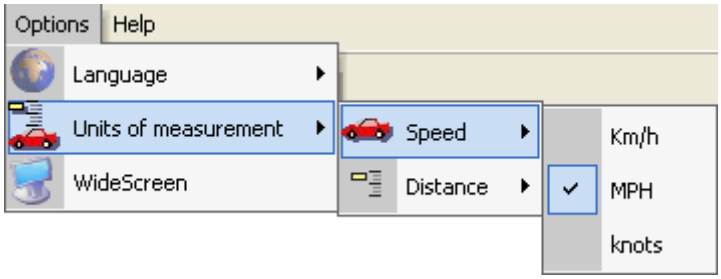
Summary

You can view basic but important information about the main '.dbn' file loaded into the DriftBoxTools software by selecting Summary from the menu. The information displayed includes information such as the time at which the file was logged and its duration, as well as any errors, such as loss of satellites during the file.

This summary may be printed or e-mailed using the icons at the top of the window.

Units of Measurement

The 'Units of Measurement' menu allows you to set the velocity units to km/h or mph and the distance units to metres or feet. Once the units of measurement have been changed the file must be reloaded for the changes to take effect.



Help

This menu allows you to view basic information about the DriftBox Tools software. It also provides a quick link to the user manual.

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Specification

GPS

Velocity		Distance	
Accuracy	0.2 Km/h	Accuracy	0.05% (<50 cm per Km)
Units	Km/h or Mph	Units	Metres / Feet
Update rate	10 Hz	Update rate	10 Hz
Maximum velocity	1000 Mph	Resolution	1 cm
Minimum velocity	0.1 Km/h	Height accuracy	10 metres 95% CEP**
Resolution	0.01 Km/h		
Absolute Positioning		**Time**	
Accuracy	5m 95% CEP**	Resolution	0.1 s
Update rate	10 Hz	Accuracy	0.1 s
Resolution	1 cm		
Heading		**Power**	
Resolution	0.01°	Input voltage range	6 – 28 V DC
Accuracy	0.2°	Current	Typically 100 mA
Acceleration		**Environmental and Physical**	
Accuracy	1%	Weight	225 grams
Maximum	4 G	Size	113 mm x 63 mm x 93 mm
Resolution	0.01 G	Operating temperature	-20°C to +50°C
Update rate	10 Hz	Storage temperature	-30°C to +80°C
Memory		**Definitions**	
Type	SD Card	** CEP = Circle of Error Probable	
Recording time	Dependent on card capacity*	95% CEP (Circle Error Probable) means that 95% of the time the position readings will fall within a circle of the stated diameter	

** Approximately 1.1Mb per hour used*

Contact Information

Racelogic Ltd
Unit 10, Swan Business Centre
Osier Way
Buckingham
MK18 1TB
England

Tel: +44 (0) 1280 823803

Fax: +44 (0) 1280 823595

Email: support@performancebox.co.uk

Web: www.performancebox.co.uk